

James R. Killian, Jr.:  
University Research and  
National Priorities

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The University in Today's World  
Graduate Engineers—Who Needs Them?  
Engineering and Society/Women in Science



# Technology Review

UNIVERSITY  
&  
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## The First Line

In the softness of the spring twilight, with dinghies dotting the Charles River and sunset light on the Boston skyline, it is easy to propose that everything is the same as it always was in the grey edifice which surrounds M.I.T.'s Great Court. Alumni returning for reunions in June found the surroundings familiar, their dreams of the "good old days" little interrupted. Yet changes there are, and it is my purpose here to suggest that changes—long-sought, fundamental for the nation as for one institution—stand behind the apparently superficial mutations evident throughout M.I.T.

What incongruities may have given M.I.T.'s spring visitors pause?

- ◇ A campus patrolman stands patiently in the corridor near the office of the President.
- ◇ Art (and some tasteless graffiti, as well) decorates the once-grey corridors (see page 19), and a refreshment stand greets visitors in the main rotunda.
- ◇ Because they have persistently sought to disrupt the process of campus decision making and discipline, two young people formerly registered as M.I.T. students have been declared unwelcome on the campus; and the Staff-Administration Committee continues to deliberate on how the Institute may respond without abridging faculty freedoms in the cases of two members of the teaching staff whose actions have been similarly (if not so crudely) offensive.
- ◇ *Voo Doo*, M.I.T.'s unhumorous collegiate humor magazine, has vanished from the scene; so have the fall, winter, and spring "party weekends."
- ◇ Campus vandalism is increasing; windows have been "trashed," slogans painted on buildings.
- ◇ Two M.I.T. classrooms have been turned over to students and staff as headquarters for political action, where visitors may retrieve voting records and interview reports from the computer, pick up political literature, and register their interest in future political action.
- ◇ M.I.T. has brought civil complaints, and members of the faculty have been in court to testify, against students.
- ◇ Faculty meetings have suddenly become emotionally charged "town forums"

for the community, a place where—despite an abundance of predictable rhetoric—hard-fought issues have come to decisions.

How does this recital of change at M.I.T. yield a judgment of fundamental and positive mutation in the Institute community? Is it not simply, as one member of the faculty has complained, a series of distractions which keep people from their real work, a preoccupation with the irrational or trivial?

It is not. For decades past its administration and faculty have proposed the Institute's obligations to assure the social usefulness of the technology which it brings forth. The lesson is beginning to find its object; the confusion of incongruous change which lies hidden behind M.I.T.'s unchanging grey walls is in fact the Brownian motion of a community at last confronting new issues and doing new things. It is not at all a question of President Nixon's "bums blowing up campuses." The issue is far better put by Walter A. Rosenblith, M.I.T.'s Associate Provost: "No longer is it enough to give a one-time proof, to develop a device, to be analytically wise and action blind. . . . We must follow our work into the real world, live with our successes and make them truly serve mankind."

We are trying to learn how.—J.M.

## Volume 72

This issue completes *Technology Review*'s 72nd volume; Volume 73 will open with an issue dated October/November, 1970, due off the presses during the last week of September.

An index to Volume 72 of *Technology Review* is now in preparation and should be available late in the calendar year. Copies will be supplied without cost to library subscribers to the *Review* and to others upon request. Meanwhile, long-postponed indices to Volumes 70 and 71 are nearing completion, and requests will be filled late this summer.

# Technology Review

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James R. Killian, Jr.

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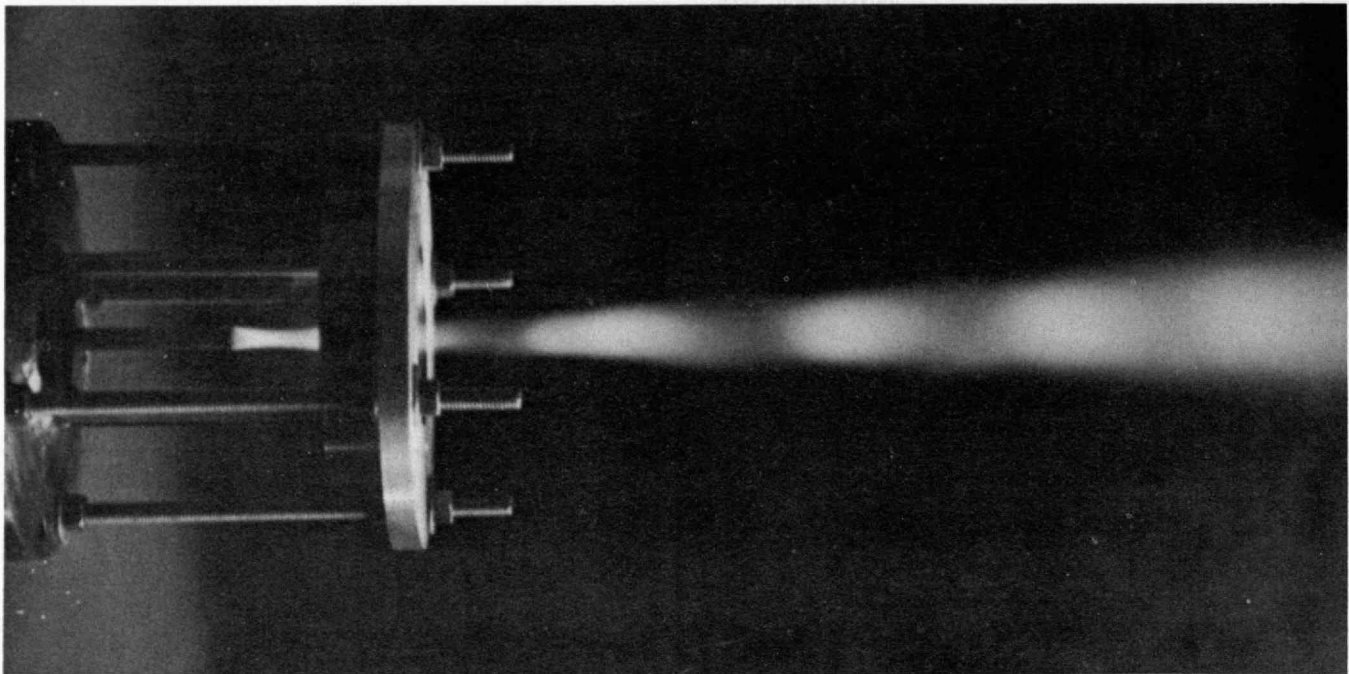
The resistance, resisters, and the law vs. university and student rights

One act of political courage begets—and deserves—another

On the university and humanity ...

... its need for change, and the society in which it serves





Variation of Flame Intensity with Ignitor Pilot Power and Stagnation Temperature in Mach 2 Stream

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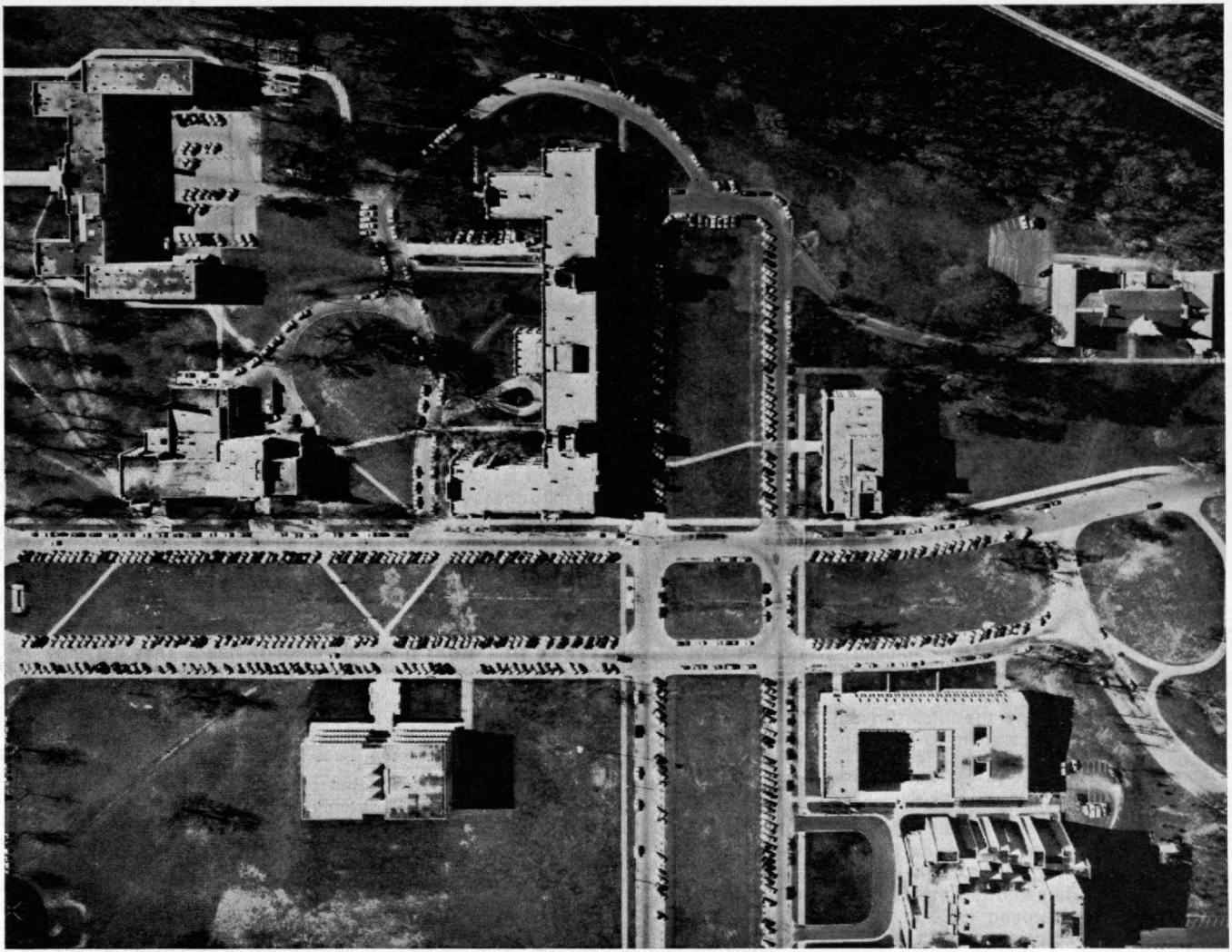
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Aquanuts are trying to prove or disprove the existence of a human "depth barrier." Can biological machinery that evolved "in a soft embrace that was never far from 15 lbs./in.<sup>2</sup>" survive and work safely 1,500 ft. below the surface of the sea?

# On Human Systems under Pressure

In their passion to "conquer" the sea, men put their bodies under pressures that would crush some older military submarines. They keep trying to see how deeply they can pursue the aquanaut game, how deeply they can live and work without the protective isolation of diving capsules.

Experts have swung between optimism and pessimism on this question of "ultimate" depth. Now a British "dry-diving" experiment and the latest French venture in aquanautics seem to be pushing back the uncertainty a little bit.

Last March, Dr. Peter Brian Bennett's team at the Royal Navy Physiological Laboratory sent three men to the equivalent of 1,500 ft. for 12 hours in a pressure chamber. They showed that a depth barrier suspected around 1,000 to 1,200 ft. by some physiologists doesn't seem to exist.

Meanwhile, at Marseilles, French aquanauts are getting ready to carry out practice work assignments at 250 m. (825 ft.) in September. Three of them have already run through an eight-day rehearsal in a pressure chamber, adapting well to the "deepest" long-duration "undersea" living yet. Men have gone to greater pressure in tests like that of Dr. Bennett. It's something else again to get on with living and working with the conditions of depth as merely the background for your activities.

A few years ago, such an authority as American Navy Captain George F. Bond, who pioneered the theory of aquanaut diving, was saying he knew of no basic physiological reason to expect any particular depth barrier for man. Nevertheless, there have been some disquieting experiments. Monkeys and other animals under pressures equal to 700-m. depths and deeper have gone into convulsions and often have died. In much shallower tests, men have developed tremors, nausea, and vertigo.

## Rising Pressures and Falling Tolerances

One of the first things physiologists suspect is the poisonous or narcotic effect of breathing mixtures. Divers use oxygen diluted by an inert gas such as nitrogen or helium. As pressure rises,

great care has to be taken to see that men get the right amount of oxygen. A little too much, under high pressure with increased carbon dioxide present to accentuate the effect, and oxygen becomes a brain poison. Yet too little oxygen would quickly starve the brain. As pressure increases, the margin between too little and too much narrows appreciably.

Then too, the carrier gas can cause problems. Dissolving in the blood under pressure, it can cause a kind of drunkenness or even knock a diver out. Divers going beyond relatively shallow depths use the less narcotic helium rather than nitrogen for this reason alone. They also like helium because, with its low molecular weight, it's much easier to breathe under high pressure than is a heavy gas like nitrogen.

Beyond the toxic effect of gases, there's the uncertainty about possible unknown effects of pressure itself on the human system. The breathing gas in his lungs, equalized to ambient pressure, prevents the diver from being crudely crushed. But may there not be subtle pressure effects beyond a certain point? Some aquanauts have, for example, reported their joints were so compressed they squeaked and crackled. They felt, as one put it, as though they had an "absence of joint juice."

## Is There a True "Depth Barrier"?

However, the evidence for any kind of depth barrier has been fuzzy. Adverse reactions in men and animals have often been transient. Individuals have recovered and appeared to adapt well to the very pressure where symptoms at first set in.

In 1968, Duke University's Ralph Brauer encountered what he thought might be a depth barrier for oxygen-helium diving around 1,000 to 1,200 ft. He was "diving" in a pressure chamber of the Compagnie Maritime d'Expertises (COMEX) with engineer René Veyrunes. They experienced what looked to be a kind of helium narcosis. Yet experts such as Captain Bond were skeptical, thinking that Brauer had merely pressurized too fast rather than run into a true depth effect. So there has been much interest in an ex-

periment to take men well beyond 1,500 ft. such as Dr. Bennett ran last March.

He built up pressure on his two divers gradually over several days. They spent 24 hours each at equivalent depths of 600, 1,000, and 1,300 ft. Then, after an hour at 1,400 ft., they "descended" to 1,500 ft. for 12 hours. They did show some of the changes in brain activity and other symptoms reported earlier. But these were transient. They recovered and carried through the test with no difficulty. If men are going to run into a depth barrier in their effort to work directly within the sea, it may well lie below 1,500 ft.

Encouraging as this result is, physiologists still grope with the unknown at even lesser depths. R. Naquet of the Institut de Neurophysiologie et Psychophysiologie at Marseilles warns that just being able to take men safely to 1,500-ft. pressures in a chamber isn't enough. He works both with aquanauts and with monkeys. The real problem, he says, is that no one knows what's causing the tremors—or in monkeys the convulsions—and other symptoms. Is it oxygen poisoning or deficiency, helium narcosis, some other subtle pressure effect? At this point, M. Naquet says, "all you can do is put a question mark. It's useless to try to draw conclusions."

And until the nature of the effects is known, men cannot feel confident about really deep diving—even though the disquieting symptoms may prove transitory in tests. Practical divers may feel that, unless pressure symptoms are incapacitating, especially if they are transitory, the symptoms can be ignored and they can get on with the job. Physiologists know that even mild, transitory symptoms may warn of subtle dangers when men try to force the human mechanism to function in such an alien environment.

Here is the kind of physiological pioneering you encounter in the space program. In space, weightlessness is a constant and alien factor. Yet astronauts tend to ignore the occasional dizziness or more subtle phenomena such as calcium loss



which they have experienced because they have not been seriously inconvenienced. Space physiologists still consider prolonged weightlessness one of their great unknowns. They have seen enough to know that they don't really know how the human system adapts to lack of gravity in the long run.

### Living and Working in the Sea

Just as weightlessness was no problem in flights to the moon, though, so diving physiologists don't expect pressure, as such, to inhibit aquanauts in France's Janus 2 project for experimental work at 825 ft. Sponsored by the Centre National d'Exploitation des Océans, Janus 2 is part of France's long-term strategy to exploit mineral resources of the continental shelf. Daniel Coulmy, who heads CNEXO's Programs Division, says shelf exploitation is a priority item for his agency. He wants to develop, as quickly as possible, the capability to have aquanauts operate anywhere on the shelf and even beyond it. Ability to work at 825 ft. would go a long way toward that goal.

When the three Janus aquanauts emerged from an eight-day rehearsal in pressure chambers, they told their press conference they had been comfortable and happy. And they had demonstrated an ability to work at significantly greater pressure than that under which they lived, a capacity that adds much to an aquanaut's value. In September, six aquanauts will live under the pressure equivalent of 200-m. depths in a ship-board pressure chamber. They will share two daily four-hour work shifts at 250 m., descending to the job by diving bell. In the rehearsal, three aquanauts simulated this by living at 200-m. pressure and twice daily transferring to 250-m. pressure for practice work with such things as oil rig equipment. They went between the two pressure levels freely, without the need for decompression.

Aquanauts have an advantage over ordinary divers in working more efficiently. A diver who returns to the surface every work shift must often spend much of the shift slowly decompressing to normal pressure to avoid the bends, the bubbling up of gas dissolved in his tissues under high pressure. An aquanaut

retreats to a pressurized house, spending his full work time on the job and decompressing just once when the entire job is finished. Now the Janus aquanauts have demonstrated that aquanauts can work substantially deeper than they live without decompression when returning to the intermediate depth. And when they return to the surface, they undergo only the decompression appropriate for their living depth, rather than their working depth. This adds to their efficiency. It gives them greater flexibility in working depth.

Dr. Xavier Fructus, COMEX physiologist, considers this one of the most important results of the Janus 2 project so far. He emphasizes, though, that the Janus technique still has to be proved in the sea. There, the aquanauts face a greater physiological challenge than just adapting to pressure. Disorienting darkness can induce anxiety that in turn affects their adaptation. Numbing cold can sap strength. Since helium in the breathing mixture is an efficient heat remover, aquanauts lose much body heat in exhaling. This adds to the water's chill. Aquanaut pioneer Jacques-Yves Cousteau has compared the experience to standing naked in the Arctic.

Aquanauts have tried to overcome this by using heated suits. In some uses, heated water is passed into their wet-suits by special tubing. However, Dr. Fructus says this only partly solves the problem. The men still lose much heat through breathing. Warming the helium also helps. Here you have to take care to warm to body temperature and no higher, for you could then overheat the diver.

### Problems for Technology

Keeping warm, holding down humidity and carbon dioxide accumulation in aquanaut living quarters, and other comfort factors are really technological problems, not physiological. And engineers still have to solve them satisfactorily. In fact, Dr. Fructus says that, strictly speaking, the May rehearsal has already shown that men's bodies can adapt to Janus 2 conditions. It's the technology that needs perfecting.

This may be true also of the tremors and other discomforts men have experi-

enced on the deeper experimental dives. If they are due to oxygen poisoning or starvation, closer control can be established over the breathing mixture. If they are due to helium narcosis, perhaps better techniques for building up to maximum pressure would alleviate them.

In the long run, says Britain's Dr. Bennett, the depth limit on diving may be set by the sheer effects of pressure as pressure, not by secondary influences of breathing gases or cold. Thus the real challenge diving physiologists face is to define the ability to withstand pressure of biological machinery that evolved in a soft embrace that was never far from 15 lbs./in.<sup>2</sup>.



Robert C. Cowen, who contributes regularly to Technology Review, is Science Editor of the Christian Science Monitor. He is currently stationed in London and has recently visited many science activities in France.

Europe's co-operative air bus project—the A-300B—now seems likely to share the field with a British aircraft, the B.A.C. 3-11. Together, they offer an enlarged choice to U.S. short-haul operators.

# Europe's Air Bus Projects

American observers have lately been remarking that Europe has nothing in the airliner class on the stocks except the short-haul air bus. The whole of the rest of the airliner market is monopolized by the United States. They may be disposed to ask why Europe's relatively small enterprise on the edge of the market should be allowed to go unchallenged. Surveys show that there should be a demand for 600 to 700 short-haul liners in the present decade and for at least 1,000 in the long run.

Boeing was tempted. The difficulty of financing the development in present circumstances seems to have checked that impulse. Lockheed likewise had thoughts in the same direction but turned instead to the long-range version of the 1011. Douglas is fully occupied in competing with the 747. In any event, American constructors appear to shy away from the big two-engine liner. Because they know they must cater for the cross-continental services with a range of 3,000 miles, they are forced to opt for the three-engine layout and they aim at making it serve for the shorter ranges as well.

The curious thing is that quite a big proportion of the United States' domestic traffic consists of passengers who travel less than 1,000 miles. Three years ago this stood at 43 per cent and it has been increasing. It now stands at 60 per cent. Europe's traffic in this category is a much bigger fraction of the whole. It stood last year at 90 per cent. The need in Europe for a short-haul bus is thus much greater than for the medium-range class which America has on offer. A maximum range of 2,000 miles with full payload will be ample, but at the same time the operational economy associated with the big unit is desirable. The formula for Europe therefore is the wide body and two engines.

There is no pretense that this can have the same payload capacity as the three-engine bus. Whereas the 1011 can be provided with 330 seats, the limit in the European bus is 270. As the European bus is said to have a direct operation cost one-third less than the three-engine type, it must be presumed to be a more profitable vehicle for European purposes. The claim made for the 1011 is that it re-

mains "fully competitive" down to a range of 500 miles; what Europe wants is a liner that will show a good profit at average load factors down to a range of 350 miles.

## The Three-Nation Airbus

European operators could undoubtedly have made do with one of the wide-body types from the United States though it would not have been tailor-made for their routes. If they had done that, they would have left the aircraft industry in Europe without a single airliner project. Only feeder-liners and executive and private aircraft would have remained to keep active the big design teams which have hitherto been concerned with commercial aircraft. There is plenty of work on the military side, and at present there is a brisk export business. British exports, for instance, stand at more than \$750 million a year, made up of both military and commercial aircraft products. Governments recognized the value of the industry in maintaining the balance of trade and this had an influence in the decision to provide the European operators with a bus designed to meet requirements. The result was the cooperative project now known as the A-300B.

That decision was encouraged by the knowledge that a special version of a new engine of European design could be made available and that it was so highly approved as to be chosen for the 1011. This engine, the Rolls-Royce RB 211, offered lightness, fuel economy, and relative quietness—characteristics derived from the use of plastic materials, where appropriate, and from providing separate drives for the fan and the two compressors so that each can turn at optimum rates in all operational circumstances. It was also designed in the modern fashion in self-contained sections to allow for easy replacements without having to change the whole engine when a fault occurs.

In 1967, Britain, France, and Germany agreed to proceed jointly with the project, and design work began on the basis of individual work done by Hawker Siddeley in England and Sud Aviation in France. In only one respect was there an attempt to break new ground and that concerned the wing.

Hawker Siddeley has been working for some years on a means of improving lift by extending it farther aft on the upper surface of the wing. This they achieved by what they called "undercutting" the lower surface. In America this was called the "peaky wing" and it has latterly been taken up by N.A.S.A. and developed to the point at which it promises, under the title of the "supercritical wing," either to allow cruising at Mach 1 or to yield a marked saving in structure weight at lower speeds.

Apart from this departure, the European bus is a conventional type in the wide body style with its engines slung on pylons under the wing and an orthodox tail. That is to say, it avoids the high tailplanes and elevators which, at pronounced angles of attack, can lead to the deep stall and make essential the fitting of automatic stick-pushers to depress the nose in critical situations. Its wing is swept back 28°, and the "peaky wing" idea has been applied not to increase cruising speed but to permit a thicker wing form to be used, with a saving of 2,500 lb. in structure weight. Slats and flaps give good take-off, climb, and approach performance. For example, the approach speed at maximum landing weight is only 130 knots (about 150 m.p.h.) This is associated with a maximum cruising speed of 570 m.p.h. and a normal range of 1,400 miles. The passenger capacity is 261.

When, last year, the governments came to the point of guaranteeing development costs, Britain found herself faced with the prospect of having to contribute some 240 million dollars, or nearly twice as much as she had expected to have to find two years earlier, and she backed out. Hawker Siddeley took over, as an ordinary commercial risk, responsibility for the construction of the wing, and the rest of the work will be shared between two consortiums in France and Germany. In breaking away from this piece of collaboration, the British Government knew that an alternative design for a short-haul air bus had been prepared and was ready for development if enough firm orders could be obtained. In this instance, there would be no question of guarantee except in the form of a loan to the constructor.



The 3-11, British Aircraft Corporation's 270-seat air bus design, is a direct descendant of B.A.C.'s I-11, a smaller short-haul airliner which has met with success in the U.S. market

### The British Alternative

This design appeared to be favored by British European Airways, the biggest short-haul operators in Europe. They were expected to need a fleet of 25. The makers decided that if they could get orders for 50, they could safely proceed. They estimated the cost of bringing their bus up to the point of production at 400 million dollars. They undertook in association with their suppliers to find half that sum and they looked to the government to lend the rest. This proposal came from the British Aircraft Corporation who had already built and sold 180 of a small short-haul liner designated the BAC I-11. The bigger, wide-body model is called the BAC 3-11. There now seems a good prospect that the project will go forward on the terms I have mentioned. The 3-11, like its predecessor, has two rear-mounted engines, in this instance the new RB 211 as specified for the A-300B air bus, and features a "peaky" (or, rear-loading) wing design. It has places for 270 passengers and a range of about 2,000 miles, cruising at 550 miles an hour. Its makers promise a direct operating cost on short and medium stages one-third lower than that of the "jumbo jets" and the three-engine aircraft. The outline of the design has been submitted to the principal short-haul operators and, in the main, has been approved. Although the constructors do not say so, this must embrace certain operators in the United States, for they take the view that no commercial airplane can be fully successful unless it sells in America. Their market research suggests that 600 to 700 of this class of liner might be sold in the United States.

American designers have so far avoided the rear mounting of engines except in the smaller types of liner, whereas the British now have plenty of experience in this field, having started with the VC 10, which roughly matches the Boeing 707, and having advanced to several versions of the I-11. The advantages are obvious. Noise is left behind. The wing is left clean. Risks of sucking runway debris into the air intakes are lessened. A shorter undercarriage can bring the fuselage nearer the ground and, with built-in steps, can facilitate loading at minor airports. Some of the disadvantages can also be easily seen.

One is that a great deal of weight is carried far aft of the usual center of gravity and this must involve some strengthening of the rear portion of the fuselage, presumably with a certain weight penalty. Another is that differential use of engine power to correct any deviation from the approach line may be less effective than with engines slung under the wing. (This effect cuts both ways, though: if an engine fails, the resulting asymmetry of thrust is less serious with central engines.) Still another is the need to put the tail organs well up out of the way of the engines. I have earlier referred to the danger of the deep stall. The prototype I-11 was lost during test flying from this cause. What is liable to happen if the nose is allowed to rise unduly high, is that the high tail becomes ineffective and the stall cannot be defeated by increasing the thrust from the engines. In that condition the stall persists, the aircraft sinks in the nose-up attitude with comparatively little forward speed and ultimately hits the ground. The cure, of course, is the stick-pusher system which operates automatically at a given angle of attack to depress the nose before the danger angle is reached. Pilots are now so well aware of the danger that they do not get caught out even if the stick-pusher system fails.

A number of United States domestic airlines have been using the I-11 during the past four years and have found it altogether satisfactory, especially in the matter of the quick turn-around on routes with many short stages. There has been no report of deep-stall trouble. The bigger unit in the same style may therefore appeal to operators whose loads have increased and who are worried about congestion if the number of services is raised. They look like having a choice between the A-300B and the 3-11. In performance there may be little to choose between them. Both have the wide body which allows room for eight or nine seats abreast with two aisles. There is little difference in cruising speed. Both can operate from 7,000-ft. runways. Both can show a good profit on stages between 350 miles and 2,000 miles. Both are capable of "stretch" if bigger loads or more range becomes necessary. The choice may depend on the small points which together contribute to ease of

handling on the ground and in the air. It may also depend on another factor.

Operators are said not to like dealing with governments or government-controlled producers. They prefer to rely on constructors direct, in the belief that they can get prompter responses and can be sure of good after-sales service. If this is true, BAC should stand a good chance of getting their baby accepted. In the past, they have sold some 250 turbine aircraft in the United States and the quality of their products is well known. At all events, Europe seems certain to fill a gap in the range of commercial aircraft in the United States and at the same time rescue her aircraft industry from total exclusion from the airliner field.



E. Colston Shepherd, at present Aviation Correspondent of New Scientist, is a British aviation writer of long standing. Formerly Air Correspondent of the London Sunday Times, his previous positions include British Broadcasting Corporation war correspondent, editor of The Aeroplane and—for many years—Aeronautical Correspondent to the London Times, in which capacity he reported the first flight over Everest in 1933.



It may be fair to say that everyone, today, fails to come to grips with society's new demands. Though its actuality is not as bad as its image and its influence not as strong as its will, the American Medical Association remains the archetype of the conservative professional society intent on maintaining the status quo.

## Toward Medical Change—Slowly

The American Medical Association is not a part of the U.S. government, but it is a part of the government of the country. You can't run a health system by the wishes of doctors alone, but you can't run it without them.

The A.M.A. thus remains one of the most important professional organizations in American technology, as well as one of the most lumbering, failing year after year to come to grips with society's new demands. Today everyone fails. But the A.M.A. has done so badly that its public image—and the commonest image now in official Washington of all doctors—is one of a bunch of really bad, selfish fellows, not to be trusted with any great voice in public policy. This is not completely deserved by the A.M.A. even at its worst, and it is not deserved at all by many men with M.D. after their names.

The A.M.A. and the doctor were plainly displayed at their best and worst in Chicago in late June. The occasion was the A.M.A.'s annual meeting, or, in this case, carnival or circus or happening.

Picture if you can a traditional conclave of A.M.A. delegates (middle-aged or aging, well-off, slightly liverish) mixed with a new-style protest rally inhabited by hip, young doctors (hair and droopy moustaches à la Elliot Gould), blacks, welfare mothers, Young Lords, Women's Libs, Gay Frontiers, and ordinary looking John Q's who belong to group health organizations.

The A.M.A.—to its credit—helped create the mix, by inviting all consumers or healers who had any gripes against medicine to appear at an afternoon-long public forum that helped to open its meeting. A nine-man committee was designated to listen. An auditorium was engaged at the convention headquarters, the Palmer House.

Some of the dissidents remained dissatisfied. They wanted to address the A.M.A. House of Delegates proper, 244 M.D.'s elected by their state associations. Some were intent, of course, on grabbing the microphone and raising hell—and on getting before the TV cameras.

The delegates, tired of such stuff at

their 1968 and 1969 meetings, decided to meet behind guarded doors, showing themselves only on closed-circuit television to most of their usual observers. A little army of A.M.A. staff members, uniformed Pinkertons, Hilton Hotel police and sheepish hotel clerks grimly manned the barrier. The delegates opened their meeting in the Palmer House's opulent Red Lacquer Room, and the image was suddenly not that of a group willing to hear dissidents but of one shutting itself off from the disturbed American scene.

Again, not quite fair. For most of the discontented were simultaneously meeting at A.M.A. expense at perhaps the first such forum sponsored by a major profession.

### "What's the Use?"

There, a pugnacious "people's chairman" quickly usurped the "chair" from the A.M.A.'s Dr. Malcolm Todd. There were signs painted "American Murderers' Association," and some angry shouts of "fascist," "pig" and "right on, brother." Todd said he was "adjourning" the forum.

Then a 1969 Howard University medical graduate—Dr. George Tolbert, head of Howard students' Marks, Miss., health project—said in a very soft voice:

"I don't like this yelling of fascist and pig. . . I was born in Chicago, and I'm not proud of this. . . I've come a long way to be here, and I want to be heard."

People listened. "I'm a physician," he continued. "I've lived in Mississippi. I have watched my parents and some of my brothers die. I have been to East Harlem and North Carolina and have seen the violence and the poor."

He pleaded for "understanding," not battling, and a "multi-ethnic" effort to improve health. His voice began to crack. He began crying, and said, "What's the use?" and sat down.

His job was done, however. The A.M.A. committee calmly stayed—to hear Mrs. Beulah Sanders, for example, plain, black, unwealthy, third Vice-President of the National Welfare Rights Organiza-

tion. She introduced her group's "indictment" of the A.M.A.: asking doctors not to refuse to treat Medicare or Medicaid patients, as some doctors do; asking equal attention in equal surroundings for blacks and whites.

The House of Delegates also stayed cool. One choleric delegate did say such sessions should be held again only if there were "protection of A.M.A. members and guests" from takeovers and "obscurities." But his Nice Nellyism did not prevail. The delegates voted to have their trustees at least consider holding such a forum at every A.M.A. meeting—an action, however difficult, that would continue to represent the A.M.A. at its best.

The delegates also gave serious consideration to demands for medical change. It is now among the facts of Washington life that health in one form or another is costing 10 cents of every federal dollar; that more than half of this sum (\$11.6 out of \$20.6 billion in the fiscal 1971 budget) is for Medicare and Medicaid; that there are growing political demands for much broader health insurance; and that the forms of medicine must be changed if costs are to be controlled.

More progressive forces within the A.M.A. are well aware of these facts. In 1967 they prompted the appointment of a seven-man planning committee headed by Dr. George Himler, a Manhattan surgeon, who is now President-Elect of the New York State Medical Society.

Dr. Himler is a conservative by most definitions and a believer in the traditional fee-for-service medicine that he practices. But he is also a realist who believes that the A.M.A. has slipped in influence because it has failed to embrace change and advance new policy. His committee, though far from unanimously, recommended:

◇ A health care "bill of rights" for consumers, spelling out "minimums" which all patients should expect in the way of "dignified and acceptable" care.

◇ Medical monitoring of the quality of services among the poor and underprivileged.

In June, Harrington used the occasion of his visit to the state legislature to report to the regents that the state treasury had actually come out ahead on Khorana's 10 years of work.

Of \$2.7 million spent on research projects in Khorana's laboratory, Harrington reported, the state legislature had appropriated \$225,000, which was more than covered by \$337,500 in indirect costs which the state will still owe. The rest of the \$2.7 million in research agency grants that went to Khorana's group (of which \$1.5 million came from the National Institutes of Health and \$500,000 from the National

Science Foundation) was covered by the state. Harrington said that the state had also covered the cost of Khorana's laboratory, which was built in 1968. Harrington also reported that the state had covered the cost of Khorana's laboratory, which was built in 1968. Harrington also reported that the state had covered the cost of Khorana's laboratory, which was built in 1968.

Dr. John S. Drenth, head of the Laboratory of Molecular Biology at Cambridge, England, has worked out the sequence of messenger RNA that codes for the

**The American Medical Association's House of Delegates, weary of radical interventions, met behind closed doors during the 1970 annual meeting in Chicago (left) to enact its "bland" resolutions. But the A.M.A. itself included in its annual meeting program an "open forum" (right) which provided a dialogue—if somewhat fractured—between left and right. (Photos: A.M.A.)**



◇ Recognizing the need for "new and improved methods" of health care delivery, and for the A.M.A. "to encourage and participate" in developing them.

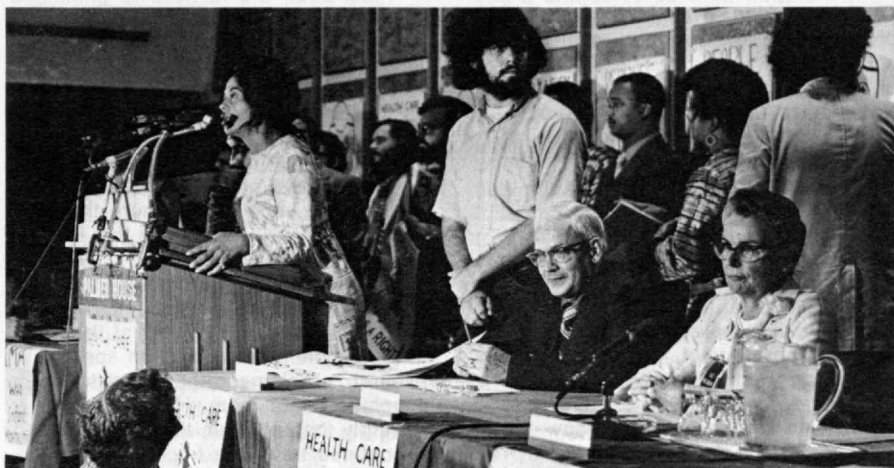
◇ Recognizing, too, that different groups may need different systems, and that the A.M.A. for the first time should "take no public position for or against" either traditional private, fee-for-service practice or new methods like Kaiser-type prepaid group clinics—long anathema to organized medicine.

The A.M.A. delegates debated these recommendations in committees, then very predictably adopted a set of reports kicking almost all the daring ones in the teeth. They left only the blandest language calling for new means.

#### Tradition in Default

But this was normal. The A.M.A. delegates are commonly more conservative—or less realistic, less close to the facts—than their planning committees and officers. The delegates typically vote "no change." But the changes occur nonetheless, because they must.

The A.M.A. and many of its state and county units are today aiding, and even helping staff, health clinics in poor and ghetto areas in several cities. But the words of the delegates tend to drown out such acts, and the country's true health planners—in the Department of Health, Education and Welfare, among state officials, Senators and Represent-



atives and their staffs, insurers, Blue Cross and hospital men—listen even less to "the doctors."

The government listens *some* to the A.M.A. The American Medical Political Action Committee (A.M.P.A.C.) put \$4 million into key Congressional races in 1968, and local doctors' committees put further impressive sums into Nixon coffers. So the Administration gives the A.M.A. its due on some issues. But on the planning of the health forms to come it no longer listens very hard.

The United States is now caught in an insensible health plan. Medicare and the hasty mish-mosh called Medicaid were loaded onto a hospital and medical system incapable of servicing them. Demand, electronics, inflation, improving wages for badly paid hospital help, and higher fees for already-well-paid doctors are all driving the costs up and up.

There are now "plans" in Washington for solutions. But the voice of medicine in the federal establishment too is currently weak. One fears that the new planning may be as bad as the old, with little input from the many doctors around the country who would agree with Dr. George H. Wood III of Brewer, Me., a younger A.M.A. delegate who uselessly stood in the Red Lacquer Room during the Hitler report's burial and said: "It is time we in the A.M.A. redirect some of our forces and develop a deeper sense of social responsibility."

The A.M.A. and the American Hospital Association and the American Public Health Association—all impressive professional groups—are not even talking very much to each other. The A.M.A. is toying with the idea of a medical "academy" to chew over political and social issues and present a united front. The National Academy of Sciences just created an "Institute on Medicine" to try to stave off other demands for such a medical grouping. Certainly some broad and responsible new medical voice is needed to help us avoid repeating the Medicare and Medicaid mistakes.



Victor Cohn, who is Science Editor of the Washington Post, writes regularly from the nation's capital for Technology Review

"The discoveries that poets and scientists make are always there. Men may shrink from them, but the tasks do not go away. They have lives of their own. . . . They make a pathway into the times ahead and may be the strongest pressure upon us to assure that human beings will be alive in that time."

# A Synthetic Gene

The painstaking, even halting, assembly of a gene in the test tube, achieved this spring in the Madison, Wis., laboratory of Har Gobind Khorana, the Indian-born Nobel prize winner who will transfer this fall to the Massachusetts Institute of Technology with nine of his colleagues, is both more important and less important than has been made out.

More important, because the synthesis of the double-stranded strip of the genetic chemical, DNA, corresponding to the 77-subunit molecule called yeast alanine transfer-RNA, is not a somewhat boring, compulsive tour-de-force of organic chemistry. It is rather a major step in understanding how the makeup of the twisted transfer-RNA molecules affects their function, which is to serve as a sort of broker at the boundary between the world of genes carrying hereditary information and that of the proteins whose composition the genes specify.

Less important, because the synthesis of a gene in the laboratory does not signify any immediate entry into the fantasy-world of "genetic engineering" in which the public is being asked to dwell prematurely. It is simply foolish for morally-concerned molecular biologists to thus seek absolution in advance of any role in building some sort of biological atomic bomb, or to question whether their studies of the rules of life as it is lived at the level of single-cell bacteria and their viruses have much relevance to human medical problems.

A certain sourness, a sort of facile desperation, has overspread much recent discussion of advances in fundamental science, including Khorana's feat (which he chose not to advertise in the usual klieg-lighted manner). It is as if new knowledge about nature brought an expansion of danger instead of converting inchoate, shapeless anxieties into graspable, definable problems.

Such emotion, of course, is as irrelevant as it ever was to the tasks of civilization. These tasks, the discoveries that poets and scientists make, are always there. Men may shrink from them, but the tasks do not go away. They have lives of their own. The most central of these

tasks for the past 300 years has been the exploration of the laws of nature. Despite an enormous consequent expansion of control over nature, the tasks of inquiry show no signs of exhaustion. They stretch without limit into the future. They make a pathway into the times ahead and may be the strongest pressure upon us to assure that human beings will be alive in that time.

## Recognition vs. Interruption

From conversation, it would appear that Khorana is unusually driven, at the age of 48, to continue working on specific research problems rather than to philosophize about them. He quotes approvingly the aphorism that "it is better to continue travelling hopefully than to have arrived," and would appear to have regarded that award of the Nobel prize in 1968 for his role in working out the so-called genetic code as an agonizing combination of long-desired recognition and nearly-insupportable interruption of the work toward synthesizing a gene. Khorana testifies that he decided on the move to M.I.T., after 10 years of unstinting support from the University of Wisconsin, in the interest of staying alive intellectually longer than he might otherwise.

Khorana seems to like a good deal of turnover in his scientific work for himself as well as his young postdoctoral research associates, with whom he works by a sort of shy indirection and among whom he stimulates a good deal of intense competition.

Since winning a master's degree at the University of the Punjab in Lahore (now in Pakistan) in 1945, Khorana has worked in Liverpool, England, where he won his doctorate; in Zurich, Switzerland, where he met his wife Esther, the mother of his two teen-age daughters and 12-year-old son; in Cambridge, England, where he held a fellowship for two years after an unsuccessful struggle to find employment in his native India; in Vancouver, British Columbia; and in New York City and Madison.

By the time Khorana announced the assurance of his group that they had synthesized the transfer-RNA gene from yeast to an audience of 460 in the

Biochemistry Building of the University of Wisconsin, several scientists who had worked on the project had left. Among them are Hans Weber and Henry Buchi of Switzerland (whose pictures Khorana showed on a lantern slide), Naba Gupta and Ashok Kumar of India, and Eiko Ohtsuka and Takashi Yamada of Japan.

Four other members of Khorana's team will not be making the move to M.I.T.: Japanese scientists Akihiro Yamazaki and Katsumaro Minamoto, who are returning to Japan; and the Norwegian husband-and-wife team of Kjell and Ruth Kleppe, who are returning to Norway.

Accompanying Khorana to Cambridge will be Marvin H. Caruthers, Vittorio Sgaramella, Hans van de Sande, Kan Agarwal, Tadeo Terao, Ian Molineux, Robert Miller, Peter Besmer and Peter Cashion.

At M.I.T. they will rejoin an old associate, Uttam L. Rajbhandary. Several new scientists will enter the group.

It would appear that Khorana's move to M.I.T. was not influenced by the recent embittered relations between the University of Wisconsin, which has been one of the nation's most distinguished centers of scientific research, and the state legislature, many of whose members have been angered at repeated student demonstrations and the need to station the National Guard frequently on the campus by the shore of Lake Mendota. The situation has caused the resignation of university President Fred H. Harrington.

A year ago, there was some danger that Khorana, whose salary was paid by the Wisconsin Alumni Research Foundation, might become a political football. Science Editor Victor Cohn of the *Washington Post*, a frequent contributor to this magazine, reports that the Republican majority leader in the Wisconsin Senate, Ernest Keppler of Sheboygan, protested against high faculty salaries at a hearing and read Khorana's name: "How about this Har Gobind Khorana? Any of you know him?" It was six months after Khorana had made the trip to Stockholm to pick up his Nobel award.



In June, Harrington used the announcement of the gene-synthesis as the occasion for a parting shot of his own at critics of the University. Harrington reported to the regents of the University that the state treasury had actually come out ahead on Khorana's 10 years of work.

Of \$2.7 million spent on research projects in Khorana's laboratory, Harrington reported, the state legislature had appropriated \$226,000, which was more than covered by \$337,000 in indirect costs which flowed into the state treasury out of the \$2 million in U.S. research-agency grants that went to Khorana's group (of which \$1.5 million came from the National Institutes of Health and \$500,000 from the National Science Foundation).

Saying he considered Khorana's achievement "the most significant event of the year for the University of Wisconsin," Harrington added somewhat acidly that for every dollar the state of Wisconsin had spent on Khorana's research, Khorana had attracted \$10 from outside.

#### The Start-and-Stop Code

The synthesis of a gene in the laboratory comes during a time of continued excitement in molecular biology. A sense that all the interesting problems have been solved at the level of bacteria and their viruses is yielding to an awareness that the details of how the hereditary instructions, locked in the genes, are expressed in a controlled way—even in the simplest systems—remain both puzzling and significant.

A protein factor called by the Greek letter sigma has been discovered which is apparently needed for the copying of specific strips of the gene, made of DNA, into complementary strips of so-called messenger-RNA. The sigma apparently combines with the RNA-assembling enzyme called RNA polymerase to help it recognize the correct "start" sequence along the DNA.

Another protein factor called rho (not to be confused with the subatomic particle of the same name) has been discovered which plays some role in making the RNA-assembling enzyme stop copying where it is supposed to.

Those two discoveries are just two shafts of light on the first stage of getting the information of the gene out to where the main work of the cell—assembling proteins—is done.

Other discoveries relate to the later stages of stitching proteins together, using the information in the messenger-RNA molecules. This stitching together of the 20-odd amino acid subunits of proteins is done using the globular protein assemblage known as the ribosome (which has its own special kind of RNA), and the tiny molecules of transfer-RNA, of which there is at least one specific type for each species of amino acid.

The ribosomes, too, have to recognize a code-sequence along the RNA messengers where they have to sit down and start bringing together the pieces of a protein. The ribosomes move along the messengers as the message is read and the protein chain of amino acid subunits lengthens. Pictures illustrating this, taken by workers at Harvard Medical School and the Oak Ridge National Laboratory, were shown for the first time in June at the annual Cold Spring Harbor Symposium on Quantitative Biology.

Dr. Joan Steitz, now of the Laboratory of Molecular Biology at Cambridge, England, has worked out the sequences of messenger-RNA that come at the beginning of each of the three main genes of a tiny virus whose genes are composed of RNA, not DNA. These initiating sequences are the ones which the ribosomes recognize and bind to, to begin assembling proteins.

It is just such initiating sequences—and analogous ones signaling termination—that Khorana needs to know exactly, and then synthesize for attachment to the yeast alanine transfer-RNA gene, before he can get his artificial gene "read" in the test tube. As the gene stands now, it cannot be copied.

#### Toward Living Systems

When he started the work on the transfer-RNA gene five years ago, Khorana could only begin with the one transfer-RNA whose sequence was known, that of yeast alanine which had just been worked out by Robert W. Holley, then of Cornell University and now of the Salk Institute, who shared the 1968 Nobel prize with Khorana.

With only 77 subunits, the gene was far simpler than those which specify ribosomal RNA or those which code for a big protein, which are apparently 1,500 subunits long or longer.

Although Khorana was working on the simplest gene known, he was working on a significant piece of biology. Transfer-RNA molecules, even though they are tiny, must have sequences on them that recognize the appropriate spot along the RNA messenger to which to bring amino acids, and they must also be able to recognize their own amino acid (with the help of special activating enzymes).

Biologist Alexander Rich of M.I.T. has described transfer-RNA molecules, on whose three-dimensional structure he is working, as standing at the boundary between gene-language, written in nucleic acid subunits, and protein language, written in amino acid subunits.

To be sure, Khorana did not build up the entire gene by step-by-step synthesis from the single nucleic acid subunits called nucleotides. Instead, when he had built up chains of nucleotides six or eight or more long, Khorana then used a

special class of DNA-joining enzymes called ligases—discovered in five separate laboratories in 1967—to join up the pieces.

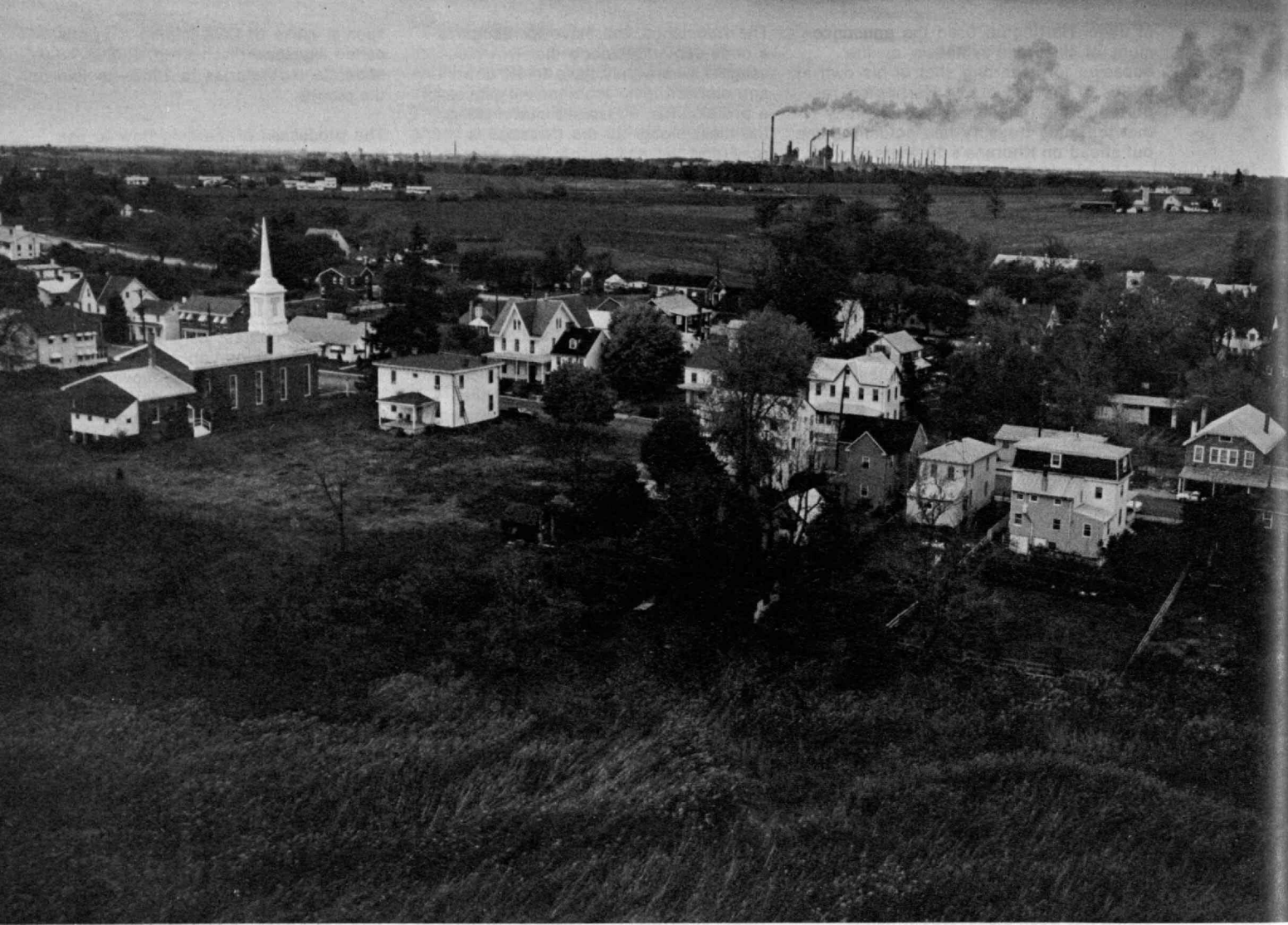
The processes of learning how to use these ligases—which in Khorana's case came from the Harvard Medical School laboratory of Charles C. Richardson—and the process of testing the pieces of DNA at every stage of assembly were agonizing. Most of the last year of the work in Madison was taken up with taking the assembled pieces back apart and challenging them with such techniques as "nearest neighbor analysis"—watching the migration of radioactive labels to see whether they moved in the expected way—and thus determining that a unique 77-subunit, double-stranded gene had in fact been assembled.

Now that it has been, Khorana is pressing ahead with synthesis of a second gene and with improving the efficiency of the techniques of assembling the subunits. He wants to synthesize the initiating and terminating sequences to get his first gene "read" in the test tube, and he wants the second gene because it specifies a special type of transfer-RNA which reads genetic "stop" signals as an instruction to insert the amino acid tyrosine into a protein that would otherwise be left unfinished. The mutation which creates this gene has the property of saving some strains of the bacterium called *Escherichia coli* from death when, by use of a special virus, the gene can be added to bacteria that lack it. With this second gene, with stop-and-start signals, and with a virus able to insert the special gene into living cells, Khorana ought—after some years—to observe the functioning of artificial transfer-RNA genes in a living system.



Victor K. McElheny, Science Editor of the Boston Globe, has followed Har Gobind Khorana's work for many years and was one of the few reporters present as he announced to University of Wisconsin colleagues last month the latest achievement in his genetic research.





CHARLES HARBUTT / MAGNUM

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# The Military-Industrial Complex Is Not This Simple

## Report from Wasteland: America's Military-Industrial Complex

William Proxmire

New York, Praeger, 298 pp., \$6.95

Reviewed by

Jack P. Ruina

Professor of Electrical Engineering, M.I.T.  
(former Vice-President for Special  
Laboratories, M.I.T.)

Not so long ago, Congress appropriated money for "pre-production" of a full-scale A.B.M. when the United States had clear nuclear superiority and the administration did not even want the money. Now Congress is attempting to restrain the executive branch and to limit A.B.M. as much as possible—or perhaps even to stop the program entirely—at a time when we regard the Soviet Union as our nuclear peer.

The communications media in the recent past extolled our cold war military leaders and warned of lagging defense programs, but now they highlight the pervasive influence of the Pentagon. Academics who formerly worried about missile gaps and technology gaps—real and fancied—now wish their universities free of all defense money even for un-directed research and despite the general consensus that the Department of Defense has been a wise and respectful contractor with academic institutions.

How far the reaction to the role of the military in this country will proceed remains to be seen. But the bandwagon effect is exacerbated by disclosures of waste in military spending, profound distress about poor military advice too well heeded, and exaggerated fears of Soviet capability and intentions frequently fueled by statements from the Pentagon.

Senator Proxmire's *Report from Wasteland* adds to the flow of literature damning the Pentagon and the military-industrial complex. His knowledge stems from his service as Chairman of the Subcommittee on Economy in Government of the Joint Economic Committee. His indignation is directed at the military establishment and indiscriminately at institutions and persons ever associated with the military establishment.

Senator Proxmire concentrates on the issues of waste and mismanagement in the military budget. The more difficult aspects of the role of the military in the U.S. are not the subject of this book: the influence of military thinking in national opinion and policy, or the effective civilian control of a large and professional military establishment.

I believe that the increasing public concern about national security matters is exceedingly important and can aid in redressing the balance of influence. From the time of the missile gap to the recent A.B.M. flap, the system of checks and balances involving Congress has not been operating well. Public and Congressional concern about the military budget, Viet Nam, A.B.M., and M.I.R.V.'s are in order to correct past imbalances.

Senator Proxmire tells us that military spending is very, very high, that many giant industrial firms depend almost entirely on defense contracts, that many of the military weapon systems purchased are either totally unnecessary or much too costly, that a symbiotic relationship has existed between the Pentagon and many sectors of industry, Congress, and the universities, and that these combined have had undue influence in keeping military spending high and in suppressing information about waste and mismanagement. The issue of the vast overruns on the Air Force's giant C5A is discussed at length.

Senator Proxmire then suggests some reforms which could help in reducing the waste. I cannot disagree strongly with his assertions, and I share many of his concerns. Unfortunately, his treatment of the issues tends to be rather superficial and strongly one-sided. He states the negatives clearly and does not mention or perhaps even recognize any redeeming virtues in any of the procedures and practices he describes. The reader cannot help but feel that "there must be something more to it" when he finishes the book.

After World War II, our basic fear of the Cold War combined with Soviet aggressive actions in Eastern Europe launched this country on the establish-

ment of an increasingly influential and affluent military department. Technological breakthroughs such as radar, jet aircraft, nuclear weapons, and I.C.B.M.'s gave technological development and sophisticated weaponry a solid place in military procurement. As a consequence, a high-technology industry supporting a community of technological experts was created who have worked very closely with and in support of defense programs.

Military departments concentrated their efforts on analyzing and understanding the Soviet threat; and when understanding was lacking, imagination frequently triumphed and resulted in exaggerated fears. The military judged their responsibility to require that they cover every possible contingency—and *this was as it should have been*. But the Congress accepted almost unquestioningly the Pentagon's assessments of the military threat and its proposed programs to counter the "threat"—and *this was not as it should have been*. For two decades we lived with the notion that "enough was not sufficient"—that the military must have anything the system could conjure up.

Fortunately, civilian influences *within* the Executive branch of government effected restraint in the days when Congressional restraint was absent. Whiz-kid analysts within the Department of Defense and the Bureau of the Budget, scientists on the President's Science Advisory Committee, and even (believe it or not) scientists and engineers serving the military service on advisory boards and at "think tanks" were of immeasurable help to the traditional budget-cutters and controllers in the government. In retrospect, much more could have been and should have been controlled or moderated, but it is amazing—given the temper of the times—how much was done.

Senator Proxmire clearly does not fully appreciate what constraints existed un-publicized within the government bureaucracy. He is appalled by the vast expenditure on the SAGE air defense system and on the aborted B-70 program, but it was the government civilian/scientist advisor complex that cut SAGE



down to size, eliminated the F108 supersonic interceptor (both before McNamara), and finally killed the B-70 as well as numerous other costly programs.

This was not easy to do in the face of the pressure and the environment created by the congressional/industrial complex, which included many of Senator Proxmire's current congressional colleagues. It was not only Mendel Rivers and a few southern congressmen who supported what we now view as unnecessary military programs; it was the vast majority of Congress. For example, there is good reason to believe that President Johnson and Secretary McNamara invented the thin A.B.M. (Sentinel) not to defend the U.S. against the Chinese but to defend the Administration against the Congress.

The internal system of checks and balances within the complicated Pentagon bureaucracy deserves some commendation, but Senator Proxmire sees only "a breed of captive scientists and science administrators who alternately serve the Pentagon, the weapons system contractors, or the university outposts of the military-industrial complex."

Senator Proxmire is certainly properly concerned about cost overruns. They are not trivial when multi-billion-dollar expenditures are involved. Vigilance and questioning are appropriate and important. But we should not lose perspective. Be it for the development and procurement of a military system or the construction of a new house, underestimates by contractors and self-deception about real costs seem to permeate the American economy. Overruns cannot be viewed as examples of a military conspiracy. Even without undue optimism, it is exceedingly difficult to predict true costs when dealing with a complex new product (though I wish that occasionally there were overestimates).

I do not share what seems to be Senator Proxmire's implication that "black-boxes, avionics, and missiles" can be as well cost-controlled as the purchase of shoes and underwear. Introducing new procurement and accounting procedures may perhaps alleviate some problems, but basically we can only rely on able and honest people doing government procurement.

#### **The New Standard of Waste**

In regard to waste, we should be aware that there are two kinds of errors in procurement—government or otherwise: unnecessary purchases will be made, and necessary purchases will not be made. Good management and wisdom can minimize these errors, but since there are many uncertainties involved, errors cannot be totally eliminated.

Trying to reduce errors of one kind necessarily increases the likelihood of an error of the other kind. As part of the cold war psychology, we have been working on the basis that we could not afford ever to be without a "required"

military system. As a consequence we had a lot of hardware and programs we did not need, and these we now call "waste". Most government procurement of non-military efforts and products works just the other way around. There is such concern about never having "waste," never having something unneeded, that a tremendous number of programs we now recognize as needed are not in the system. We have not had a national commitment with tolerance for errors of commission in other areas of national policy—i.e., health services, education, urban problems, etc.

We now see the strategic balance as stable and realize that delaying or limiting the procurement of a weapons system will not alter the balance significantly. This is the spoken and unspoken message of the day. Therefore, we now are aware of "waste" which we previously tolerated in the interest of avoiding any possible error of omission in military procurement. We are also becoming sensitive to the fact that we have been negligent in fulfilling many non-military needs; when we compare the military and civilian sectors we are appalled at what we have wrought.

It is not that the military did its job badly. It is that many elected and appointed officials did their jobs badly. In fact, considering the size and popularity of the defense budget, it is surprising (and encouraging—and speaks well for the Pentagon) that more scandal and more abuse of power didn't occur. Although the influence of the military-industrial complex throughout the country was great, we now see the complex beginning to crumble under the weight of current public opinion.

#### **Perspective on Conflict of Interest**

Senator Proxmire makes the movement of employees between the industrial establishment and the Pentagon—civilian and military—look sinister. Surely there are dangers here, but is it really different from the way other sectors of American government and industrial employment operate? Of course people tend to stay with those areas of work that they know well. Of course new employment frequently arises because of people met in the course of a job. Is it fundamentally evil to have a former medical school dean administer a government health service program, or would Senator Proxmire rather have a former watch manufacturer in the job? Is it fundamentally evil to have a former government medical administrator become head of a private medical research center, or should he be forever barred from useful, productive employment in the private sector which capitalizes on his training, expertise and maturity?

Conflict-of-interest problems cannot and should not be dismissed, but perspective is necessary. Would it be better if we hired "virgin" professionals who had never consorted with the bureaucracy—would they know when they were "had" or when they were cuckolded by their

bureaucratic peers or superiors? Proxmire himself specifically makes the point that President Eisenhower could function without being intimidated by the military just because of his association with it.

My own case is illustrative. I use it only because I know it better than any other cited in this book. Proxmire excerpts accurately my connections with the defense establishment. No mention is made of the fact that almost all of my career has been as a university faculty member and all of my time in Washington was on leave from university positions, or that all my personal testimony to the Congress on defense matters has been to counter Defense Department arguments favoring certain large military programs, although that information was also readily available.

I believe that the degree to which I could be relatively "culture free" in my Washington career was due in some measure to the fact that my main career was in the academic world. Quite apart from the fact that I found my experience in Washington exciting and highly productive in the process of developing a rational defense research and development program, I would urge more academics to risk getting their hands dirty in government affairs. I think I have developed useful perspectives which would have been impossible had I remained "chaste" on the outside.

I happen to believe that it is terribly important to the nation for some academics to participate in the government process—and not for all to be the honorable but sometimes naive and powerless opposition. Do any of us want such a polarized situation that everyone is either "with 'em or against 'em?" Don't we want to have a system which encourages a wide variety of people to participate in bureaucracy with the sense that the bureaucratic system needs differences within its structure if decisions are to be as wise as possible? Only total despair about the future of our government and our country would cause a negative reply.

#### **The Special Role of Academics**

It is worth noting that the anti-A.B.M. "experts" who are able to present the case as it depends upon profound technical understanding, are almost to a man people who have had government experience. In fact, a matter that should be of great concern to Senator Proxmire and other members of Congress is the increasing alienation of academia from the military establishment—defense is certainly too important to be left exclusively to the military. Senators and citizen groups alone, however well intentioned, will not be able to muster the substantive technical arguments that derive from professional engagement and personal experience.

Senator Proxmire recognizes the vital role of the scientists and former government officials in the A.B.M. debate,



Twenty-one air traffic control centers (like this one in Leesburg, Va.) keep watch on federal airways. Part of their burden consists of private aviation—how much, and how disciplined, being the subject of controversy in Thomas Imrich's review of *The Case Against Private Aviation* (below).

but he diminishes their contribution by writing, "They (the neo-academics in Boston) . . . bite the hand that feeds them by protesting the establishment of a local A.B.M. site when the reality of the work impinges too closely on their personal lives." I do not believe that he was referring to the former Presidential Science Advisors and other former government officials now in the Boston area who testified very effectively against A.B.M., but I do think this is perhaps an unwarranted slur on the integrity of others. Besides, if an issue is important, self-interest can be a highly effective motivating force and even Senators can be subject to its benign influence—with consequent benefit accruing to the Senator, constituents, and the national interest.

Those of us who have been at universities in the past year or so will wince or smile at Senator Proxmire's worry about the military-academic complex. Does he think that the sizable defense research expenditures have made captives of the academy? If the universities are indeed more militaristic than the rest of American institutions, with or without substantial defense contracts, then only God may be left to defend us because the Pentagon won't be. Indeed the argument could be made that biting the hand that feeds rather than defending it is more the order of the day in the academic world. But academics have always been reputed to be perverse.

Somehow, though I believe this book is valuable because it stems from a Senator who speaks with some authority, I wish that it had been written eight or ten years ago. It would then have been in the vanguard of much-needed criticism, even though it deals primarily with efficient procurement. It would have opened up so many issues which are now freely discussed and evident in the marketplace. Now many dimensions of the problems are so profound that they need treatment of a much deeper sort than this book provides.

## Know Thine Enemy

### **The Case Against Private Aviation**

Donald Bain

New York, Cowles, \$5.95, 208 pp.

Reviewed by

Tom Imrich

Flight Transportation Laboratory  
M.I.T.

Fair portions of a lifetime are wasted in traffic jams. Lately, these disturbances have been transcending the bounds of highways, railroads, and subways. Congestion is common at the nation's overburdened airports, and even between them. Inconvenience is bad enough, but, in addition, our air transportation system's ability to provide necessary levels of safety is rapidly being overtaxed.

Author Donald Bain tries to indict the private pilot as a major source of these evils of civil aviation. Supposedly written from the point of view of an airline passenger, his book is like a boxing match, with private (or, "general") aviation in one corner and airline management in the other. The Federal Aviation Agency is cast as the prejudiced referee, intimidated by the nation's private pilots.

Most books permit you to read well into the first chapter before confronting you with glaring errors. This one starts off in grand style with a 300 per cent error on the front jacket. The jacket says that "half a million noncommercial aircraft now using our airways have created a new and perilous problem." In fact, there are about 125,000 nonairline aircraft—and a large number of these are commercially operated. Mr. Bain thus gives us a hint of his shortsightedness—and in the 208 pages of the book he proceeds to prove it.

The author's lack of perspective regarding aviation matters shows in his hasty generalizations and grievous omissions. Throughout the book Bain attacks the Aircraft Owners and Pilots Association as a representative of "150,000 pleasure pilots" any of whom could knife into a Boeing 707 on final approach to Kennedy International Airport, or at very

least disrupt New York area jet traffic completely by getting lost. He does not comprehend that a great number of A.O.P.A.'s pilots and policy makers are professional pilots. A.O.P.A. by no stretch of the imagination can be considered to represent 17-year-old drunken pilots, defending their right to threaten airline safety and disrupt service. General aviation in no way deserves to suffer from what seems to be Bain's personal feud with A.O.P.A. His condemnations of its policies and staff cannot be disguised as a case against all of general aviation. Only about one-fourth of the nation's pilots are represented by A.O.P.A. Carefully brushed under the rug are numerous organizations representing the other 75 per cent.

Bain's serious omission is his failure to consult the airline pilots who obviously should be in the middle of this staged controversy. He never mentions a word about the airline pilots' associations, nor makes an attempt to solicit the views of the cockpit crews he so valiantly defends. His cause is a war against a fictitious enemy.

Airline pilots, military pilots, air traffic controllers, F.A.A.—anyone who lives with the system from day to day—realizes that the present ills of aviation are basic to the system itself. They do not stem primarily from any one class of user, organization, or political party, and anyone who claims they do must be regarded with caution. Bain conveniently forgets that experienced line captains were once fledgling pilots and that most of the pros are still actively involved in some phase of general aviation. In fact, they often assume the role of leaders in private aviation.

Bain's frequent tactic is to demonstrate a problem area, document this problem area with abundant statistics, and then skillfully lead the reader to believe that general aviation is at fault. A prime example is the treatment of the New York airline delay crisis. Bain offers detailed statistics on wasted time, money lost, crowding of terminals, and so on, based on the situation during the summer of 1968. Evidently, he hopes that the reader will fall into the trap of believing that general aviation is at the root of the problem. The fact remains that if all private pilots stopped flying tomorrow, air transportation in major urban areas would still face the same serious congestion troubles.

The chapter on the private pilot's right to drink and fly can be answered with a simple rebuttal that there are already not one, but two existing regulations prohibiting the combined use of bottle and throttle.

The attempt to produce a scholarly-looking text by inclusion of aviation chronologies, assorted facts, and edited accident reports is marred by the misuse of this information. This is especially true of the interviews which were conducted—quoting various officials freely, out of



context. Though lip service is paid to the presentation of opposing views, justice is never done to such arguments. Thus, Bain's true colors become obvious: *The Case Against Private Aviation* is an overly dramatic attempt to start a bandwagon movement among unsuspecting readers, or at least sell a lot of books during the controversy. As a case against general aviation, the book is grossly mis-titled.

The time is certainly ripe for someone to state a balanced, realistic case describing the ills of general aviation, along with airline safety and a variety of other aviation problems, but this book certainly does not do the job.

## **Lazzaroni in the Atomic Age**

### **Dollars for Research: Science and Its Patrons in Nineteenth Century America**

Howard S. Miller  
Seattle, University of Washington Press,  
258 pp., \$9.50

### **Science and the Federal Patron**

Michael D. Reagan  
New York, Oxford University Press,  
346 pp., \$7.50

Reviewed by  
Harvey M. Sapolsky  
Assistant Professor of Political Science  
M.I.T.

In the United States, basic research has led and appears likely, despite its recent affluence, to continue to lead a precarious existence. This is so because while science is an elitist calling whose societal benefits are difficult to predict, impossible to appropriate completely, and visible often only in the long term, national orientations are democratic and favor more calculable, more particularistic, short-term gains.

Basic research survives and occasionally prospers in the United States on the wit of its leaders. Their ability to interpret, to rationalize, and even to disguise the purpose of basic research—the advancement of knowledge—in ways which satisfy the special interests of private and public patrons determines the financial resources of science. Since there can be no guarantee that the product of a given basic research project will meet the needs of its sponsor, faith in the efficacy of research must be carefully cultivated and continually renewed.

Some have mistakenly viewed the massive increase in support the federal government provided for research and development activities in the post-World War II period as indicating the establishment of a major national commitment for the development of science. To be sure, federal funds for science became more freely available than ever before in our history. For example, while federal outlays increased 130 per cent between 1953 and 1965, federal support of basic research increased over 500 per cent during the same years. Total federal allocations for basic research have exceeded

\$20 billion since the end of World War II. However, as the current leveling off of federal science support reveals, these billions were allocated not because there was a commitment to fulfill the promise of science, but because there was a commitment to fulfill the needs of national security, prestige, and economic growth; and science promised to serve these goals well. But now, the perceptions of military threats have changed and the efficacy of science in serving both foreign and domestic policy goals is being questioned; thus the financial base of basic research is once again problematic.

Two recent books have highlighted the plight of science. One is a study of support for research in nineteenth century America by Howard Miller, an historian; the other is an analysis of federal-science relations in the post-World War II period by Michael Reagan, a political scientist. Both deserve the attention of those who wish to influence future support for and direction of science.

Miller's study focuses on the role private philanthropy played in the development of science in the United States. Engagingly written, the book describes the problems and personalities of men such as Alexander Dallas Bache, Louis Agassiz, George Ellery Hale, Joseph Henry, Benjamin Gould, and Asa Gray who promoted the professionalization and growth of science in the new nation. The obstacles to their success were great since industrializing America found little to be attracted to in the advancement of abstract and esoteric research. Unless blessed with personal wealth by birth or marriage, a scientist then needed to be a persuasive salesman in order to practice his profession.

The creativity of the early scientists was demonstrated in more than their research. They used to advantage arguments of regional competition, national pride, and social conscience to found many of the private institutions of higher learning and research which today distinguish American science. Administrative and financial innovations preceded and facilitated scientific accomplishments.

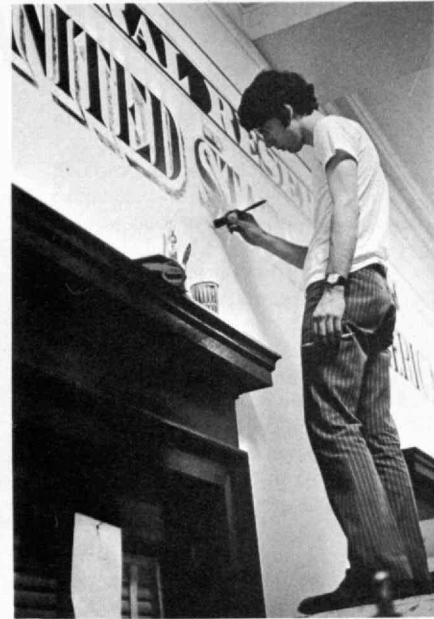
On the claim that it was less dynamic, though equal in scale, to private philanthropy, author Miller covers less thoroughly nineteenth century public support of basic research. He does, however, record the battles over the establishment of the Smithsonian Institution and the Geological Survey. Here too opportunism was crucial to the scientists' success. John Wesley Powell, for example, sensing the mood of the Congress and the country in the discussions of the Survey's organization, could argue that a national geological agency should focus only on practical research which would have short-term economic benefits, but as the agency's director he would later—when public attention was on other topics—allocate resources to support fundamental research unrelated to economic development.

In contrast, Reagan's study of post-World War II science focuses exclusively on the role of the federal patron in the support of U.S. basic research. The justification for this focus lies in the fact that the federal government is now clearly the dominant financier and risk taker in research and development activities. Reagan effectively describes the challenged assumptions upon which the current de facto national science policy is based and the pluralistic organizational and advisory structure through which it is administered. From this perspective his book is a first rate—if somewhat redundant—contribution to the science and public policy literature.

Reagan, however, is more ambitious. He is a reformer and seeks to outline the requirements for a rational policy for national support of science. This is a Herculean task, for, as Reagan himself notes, "there is no scientific method of constructing a science budget." We know that the market mechanism will not support enough science and scientists to meet societal needs and thus there is a need for public aid. But we do not know, and neither Reagan nor anyone else can tell us at present, what is the appropriate level of support and how this support should be distributed among the various fields of science.

Missing from his analysis of what might be done in changing government-science relations is a careful examination of what is *politically* possible and desirable. As the nation loses its preoccupation with military preparedness, technological competition, and economic prosperity—policy concerns for which science is thought to have substantial payoffs—its indifference to science qua science will be quite evident. To propose, as does Reagan, that the Congress consider an explicit, formal commitment to the support of basic research and that the executive-branch's science-policy mechanisms undergo a significant structural and procedural reorganization would appear to be courting greater financial problems for science than already exist. Survival for science has long lain in being part of everybody else's favorite program and in not having one of its own. Before major changes are attempted their financial consequences should be assessed. The final test for reform is always political reality, not logical consistency.

Given the current scale of the scientific enterprise in the United States, its prime patron must remain the federal government. However, scientists need a new rationale for the support of research if the federal government's financial interest in science is to be maintained. As Reagan and others have pointed out, among the possible candidates a rationale which links science to emerging national goals in education seems to be the strongest in terms of potential support and the closest to the purpose of science. But this rationale will not gain currency until it is recognized that accommodations will have to be made with interests in education which have greater value in the eyes



of the public and thus greater claims on the federal treasury.

In the nineteenth century those who wished to promote the development of science in the United States formed the Order of the Scientific Lazzaroni appropriately named after the poorest class of Neapolitan beggars. In the twentieth century, American science is still—like the Lazzaroni—dependent upon patronage and still in need of a strategy to promote its development.

### To Cope, Cop, or Opt

#### Environmental Design

Richard P. Dober  
New York, Van Nostrand Reinhold Co.,  
1969, 278 pp., \$18.50

Reviewed by  
John I. Mattill

Let the reader beware. This editor has volunteered a comment upon Richard P. Dober's book not as a professional architect or planner, but because he believes—as does Mr. Dober—that architecture and design are so much a part of our daily lives that we all share their experience and may indeed share their creation.

Mr. Dober's message is that environmental design—land use, landscape, architecture—is the servant of man's changing demands and powers. Thus the change from fortress cities of medieval times to the urban sprawl of the automotive era, from Victorian ornate to modern simplicity, from unfenced desert to New Mexican ranchettes. Yet in these changes man is not impotent.

Has technology—confronting the world with such unanswerable questions as, How can we at once have more energy and less pollution? or, How can ever-growing numbers of people live and work together in cities which are already almost ungovernable?—brought to environ-

mental design the ultimate obstacle? No, writes Mr. Dober; it simply means that environmental design must broaden itself, use effectively the tools of technology, and return to this fundamental: "Environmental design is not a set of formulae about how to design the space occupied by man but a set of attitudes about how to arrange the physical elements in the environment to achieve a satisfying and rewarding habitation."

In a subsequent interview, Mr. Dober has extended his views to describe "a new environmental esthetic," under which "the environment is not imposed by the designer on the basis of archaic notions of scale and perspective but surfaces from a regard for how people live in their environment, affect it, and are conditioned by it."

A case in point for Mr. Dober's argument has enlivened the public spaces at the Massachusetts Institute of Technology this spring. Tradition has dictated that M.I.T. has been a place of formal visual experiences, consistent—presumably—with the austerity of greatness. There is an austere entrance rotunda which renders diminutive all who enter, and there are corridors which seem by their monotony to emphasize their length—and hence the Institute's size.

But in two months this spring all that has been changed—and remarkably, by the act of the users themselves. The great formal rotunda is now adorned with a refreshment stand selling coffee, pastries, and fruit; chairs and tables; newspapers and posters; and people—including, occasionally, groups of musicians whose sounds have carried to much of the Institute through the radiating corridors.

And the corridors themselves have suddenly become colorful with murals and collages. Some are literal, like the wall-sized dollar bill which surrounds the entrance to the Cashier's Office; some are political, like the portrait of Malcolm X

*The environment should be achieved by its designer, says Richard P. Dober in Environmental Design, "from a regard for how people live in (it), affect it, and are conditioned by it." And if the environment is already there—as is the case at M.I.T.—let its occupants make their own changes. In the pictures: a string quartet in the entrance rotunda, and a \$1 bill on the Cashier's wall. (Photos: Richard M. Koolish)*

done in reds and purples; some are social and surely humorous like a "ban-the-bra" abstraction outside the room in which work the bevy of Admissions Office clerks; and some are abstract, simply for the sake of color and mood. If I am not mistaken, this is Mr. Dober's "new environmental esthetic" in action. But what about technology? Neither M.I.T. nor Mr. Dober forget its pervasive influence. Despite, for example, the appearance of spontaneity in M.I.T. corridors, Mr. Dober insists that the modern world is larger than M.I.T., that "neither the quantity nor quality of the designed environment will emerge spontaneously, episodically, and unregulated. Intuitive response, the traditional tools of the design professions, are no longer sufficient. The scale of the problems and the scale of the solutions are beyond simple elucidation."

But technology is, in fact, a system, and it offers its own remedies to those who will see them. "The very complexity of technological change itself has stimulated ideas for organizing and applying the process of invention and production," Mr. Dober writes; and in just that way, for example, have principles of scientific management come to the rescue of planning. Among these he notably cites computer science, by which planners can now analyze and present clearly extraordinary amounts of data, even demonstrating visual alternatives in site planning and land use studies. To "cope, cop, or opt" remain alternatives for man, after all.

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‘Whirlpool takes better care’?”

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**Quality.** We strive for outstanding product quality the only way we know how. By building it into every product, to begin with. And by maintaining a standard of continuous quality control.

**Warranty.** We have changed the standard wording of warranties some time ago. And replaced it with a simple, friendly Letter. There's no fine print in our Warranty Letter. Just every-day words that state exactly what Whirlpool will pay for and what we will not. Most every Whirlpool dealer has copies of all our Letters on hand so that customers can read any one *before* they buy.

**Service.** Factory-trained service technicians are

available at Whirlpool Tech-Care centers spaced throughout the country. Each center must maintain rigid standards of training and performance for annual renewal of its Whirlpool franchise.

**Customer Information.** Whirlpool appliance owners may phone us, free of charge, from anywhere in the continental U.S., anytime of the day or night. Whirlpool will provide the name of the nearest Tech-Care center and answer questions concerning operating and maintenance. (In Michigan the number is 800-632-2243; nationally the number is 800-256-1301.)

**Warranty Service Central.** Available anywhere in the U.S.; Warranty Central assures that the free labor and parts as specified in many of our Warranties is always available, even if the owner moves to another area of the nation.

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**Whirlpool** takes better care.

CORPORATION

Benton Harbor, Michigan



Or, for that matter, is Los Angeles? Or Chicago? Or Philadelphia? Or Dallas?

Or any other city groping its way to an uninhabitable anachronism.

A curious situation has developed in America. Eighty per cent of the people in this country live on less than ten per cent of the land area.

There used to be a good reason for this.

At the time of the industrial revolution, we congregated in cities because that's where the sources of energy were. Coal. Water. Electricity.

And our communications network was so limited that we had to be in close proximity to each other for business and social purposes.

No more.

There are no longer any good reasons to continue this hopelessly outmoded life style.

With the advent of the whole spectrum of new communications available to us (wide-band communications, laser beams), we will have the opportunity to live in significantly less dense population centers.

This is no idle prophecy.

The concept is quite realistic and well within the bounds of en-

gineering capabilities which we already have.

Not only do we have the tools to provide the means for new styles in human settlements, but also to rebuild, in a sociological sense, the crowded inner core of our major cities.

The combination of international satellites and cable will provide the means of bringing individuals all the information they need or want without interference or control.

And without the need to be in any specific place.

(Think for a moment about the Apollo 11 moon landing in July, 1969. 500 million people around the world saw, via television, *precisely the same thing at the same time*. Being in New York or Los Angeles held no advantage over being in Keokuk or Harrisburg.)

Historically, we've been preoccupied with moving people and objects. Thus, our intricate network of highways and railroads and airlines — all of which have become enormously inefficient (not inherently, but in application).

The future will see us moving

information, not, by necessity, people and things.

Your home will be the absolute center of your life.

You will work from home, shop from home, "visit" with family and friends from home, receive in your home any intellectual or cultural achievement known to man.

Fantastic, yes. Fantasy, no.

It is quite within reason to expect these changes by the 1980's.

If we want them.

If we want to change. If we want a better life for ourselves.

Technology has advanced to such an extent, that man is now, literally, capable of changing his world.

Yet, today, a certain gap has developed between the potential of technology and its use by mankind.

There is an obvious contradiction in a method which can land a man on the moon, yet tolerates, perhaps even accepts as inevitable, poverty and ignorance here on earth.

There is a contradiction in a method which affords the best of everything for some, and next to nothing for others.

So we must, in a sense, catch up with the technological potential and apply it for the benefit of all mankind.

All we need sacrifice are the antiquated work practices and our anachronistic traditions.

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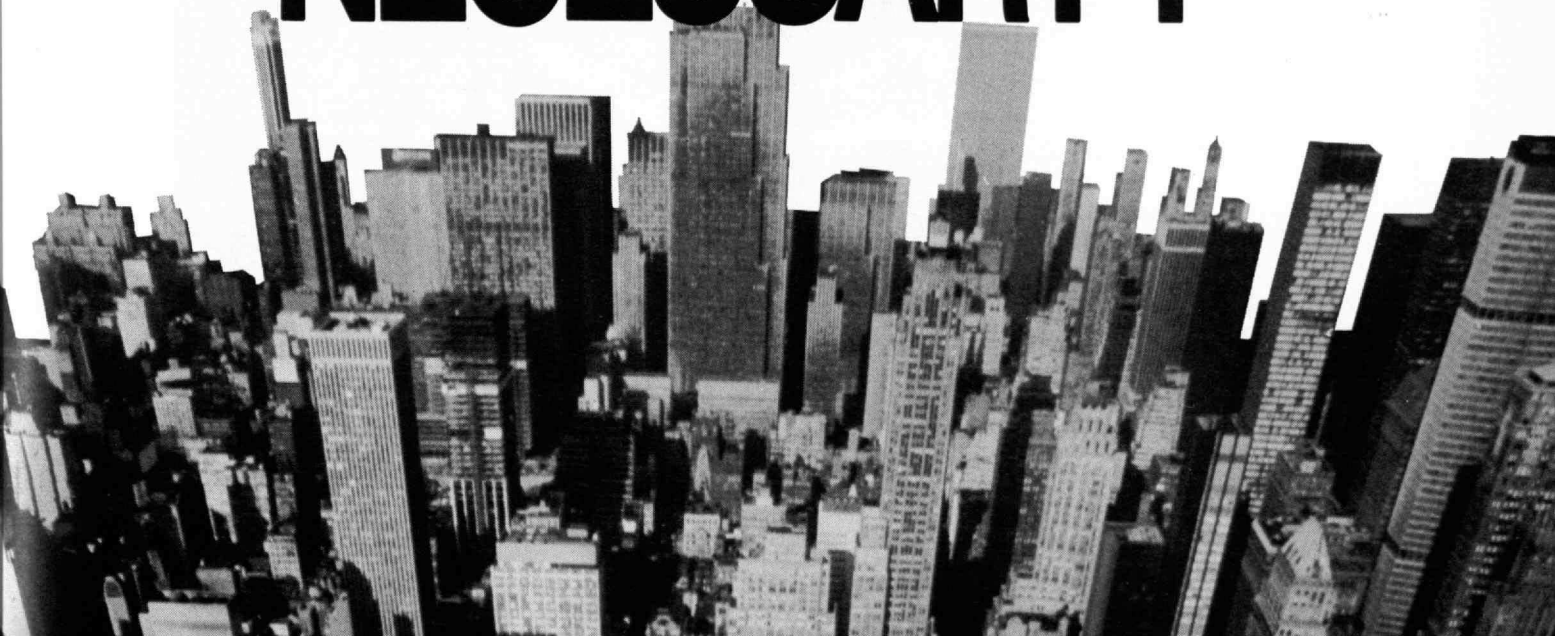
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# IS NEW YORK REALLY NECESSARY?



*"The great university centers of teaching and research in science and engineering," Dr. Killian writes, "have been one of the principle sources of industrial advance . . . it is of the greatest importance to understand the dangers to the nation in permitting the great resources that have been built to erode or be dispersed."*



If knowledge is now central to society, the place of research in the university must be preeminent—even in an era when its support is being drastically eroded by inflation and financial cutbacks

James R. Killian, Jr.  
Chairman of the M.I.T. Corporation

# University Research and National Priorities

The university has become one of the primary institutions of American society. It has the responsibility for most of the nation's basic research and scholarly studies. It provides education for undergraduate and graduate students and for the professional talent our complex society requires. In addition, it is called upon to perform a great array of public services where expertise is required and to provide consultants or advisers to government and to business and industry. As Clark Kerr has said, "Knowledge is now central to society. It is wanted, even demanded, by more people and more institutions than ever before."

The United States is indeed becoming a research-dependent society. In almost every aspect of life, the nation relies more and more on knowledge-seeking, problem-solving techniques. Almost every activity, not just technology, is invigorated by research—law, management, economics and the other social sciences, the political process, and even the arts. And in these times of stress and crises, the scholar in his study and the scientist and engineer in their laboratories are looked to for ideas and problem solving to cope with a deteriorating environment—with pollution, poverty, and the arms race.

Let me examine the role of our American universities in scientific and engineering research.

During the past several decades, university science in the United States has yielded a spectacular harvest, and American science has achieved unquestioned world leadership. For ready indices of this accomplishment, recall some of the now almost trite statistics. From 1900 to 1930, American scientists received only seven out of 93 Nobel Prizes. In the 1950's, they received 30 out of 54. And in the 1960's Americans received 28 out of 57. As I. I. Rabi once pointed out, the *American Physical Review* in 1927 did not command much attention by European physicists; but by 1937 it had become the leading journal of physics in the world. Today, in the literature of world science, reference to American scientific journals exceeds those of all other foreign scientific publications. And, parenthetically, some statistician with time on his hands figured out that about 15 per cent of all the words ever written on scientific subjects were written in 1967!

The place which American science had achieved, es-

pecially in the universities, prior to World War II was profoundly important to the winning of the war. The vigor of the American economy has resulted in part from the new industries, new processes, and new products generated in the scientific laboratories of the nation. While American science was achieving world leadership, so was the nation's industrial strength.

In this great intellectual surge, American colleges and universities have been major contributors. Of the 90-odd Nobel Prizes won by scientists in the United States, something like 85 have been received by university scientists. Clearly, the university has become the principal home of basic research in the United States, and the quality of the research has been superb. This does not mean that important basic research has not been carried out by other types of institutions. Indeed, it has flourished in a few distinguished industrial and governmental laboratories, and in private research institutes. But the major responsibility for basic research has rested with the universities, with the industrial laboratories drawing sustenance from this basic research and themselves specializing brilliantly in applied research.

It is the special strength of university research that it is imbedded in the process of education. Science education must take place in the provocative, generative environment of creativity, with the young apprentice scientist himself learning by research and in this way gaining the insights, the skills, and the outlook which are in combination essential for productive scientists.

Another important achievement in the domain of science and engineering in the United States has been the interaction between the scientific communities in the universities and those in industry and government. This close relationship has made it possible for new data to flow more easily from university laboratory to application, and it has especially accelerated the process of bringing the results of basic research rapidly into effective use.

This process of putting science to work has also been aided by the close interrelationship in many university laboratories between basic research and applied research, between science and engineering. This partnership serves to stimulate and enrich both science and technology. Universities are uniquely able to facilitate



Interdisciplinary communication, and this affords them special opportunities to achieve innovation.

The great university centers of teaching and research in science and engineering have been one of the principal sources of industrial advance. The spectacularly successful role of the land-grant colleges in the United States in fostering high-yield agriculture has long been recognized. It has been basic research systematically made available to farmers that has made possible the spectacular increase in yields of corn and wheat. As a result of their research, universities have likewise played a major role in the generation of new industry. Research and development in scientific and engineering institutions made major contributions to the origin and growth of the computer industry. The chemical, electrical, and nuclear industries have derived much from research carried out in both university and non-university laboratories.

Research in the universities has provided a steady succession of medical discoveries vital to the health of the nation, and technology generated in universities has contributed to the spectacular success of the space program, including the safe landing of men on the moon and their return. Inertial guidance and navigation for missiles and space vehicles is the product of a world-famous laboratory in my own institute of technology. Engineering research in institutes of technology has provided fundamental concepts underlying the development of catalytic cracking in the oil industry; and the development of digitally controlled machine tools, one of the most important industrial advances of our time, took place in the laboratory of an institute of technology.

Today America is witnessing the opening up of new domains of science which can have profound effects upon society. This is a period of major biological discoveries which are yielding great advances in medicine and are unravelling the mysteries of genetics (and, as a result, are raising profound ethical and social questions). There is a growing collaboration in universities between the life sciences and engineering, particularly between medicine and engineering. Applied scientists and engineers in the universities are turning their attention to such socially important fields as energy conversion, transportation, and environmental control. Many of the environmental and ecological problems that now require urgent attention must in part

be solved by bringing to bear in new ways the resources of science and engineering. This can only be done, however, through effective community and political leadership and through the adaptation of political organizations to deal with pollution and similar problems in new ways.

The future record of the universities in basic research and in the education of creative scientists and engineers will result in part from the stimulus of young minds working closely with older minds. Research in the pure sciences certainly seems to flourish best when there is an interplay between students and teachers, each invigorating the other.

Students who have studied the conditions conducive to effective research have also pointed out that creative work tends to flourish best in an environment that is adaptive rather than authoritarian. The open environment of the university, with its freedom of inquiry, its emphasis on the individual, and its lack of a hierarchical organization, seems to be important in the conduct of successful research.

The university environment is also benign because it provides interaction between many different disciplines. Perhaps one of the most important factors in the American economy of today and in the present state of industrial activity has been the opportunity in universities for science, engineering, management, and the social sciences to work together side by side, each having an impact upon the other.

Today universities, particularly their programs in science and engineering, are moving into a critical period. The federal government is cutting back on funds for research, and in a manner that is unplanned and therefore the more damaging. This reduction is made much more serious by steady inflation. The consequent drastic curtailment of research not only affects the amount of work done but also its quality and the training of men and women to do research. It threatens the breakup of experienced teams and the closing of major facilities. Indeed, it threatens to erode the preeminent position of the United States in science and technology.

The nation also is undergoing a period of skepticism about the benign uses of science and technology, and

## Fitting Technology to Today's Society

there is too much tendency to blame science and technology for their misuse instead of dealing with the more central problem of how to direct these great resources toward humane ends. The way to ensure a humane environment and to advance the quality of society is not to cut back on the contributions of science and engineering, particularly at a stage of flood tide in creativity in these fields, but rather to master the problems of control and use, of technology assessment, and of foresight. The universities have a major role to play in helping to put science and research to use for humane purposes.

The present adverse view of science has been summarized by one of our distinguished physicists, Victor F. Weisskopf, Head of the M.I.T. Department of Physics:

"Today science is attacked from two opposite fronts: One is a mounting public opinion, shared by some members of Congress and government, that the study of nature for its own sake, the search for deeper explanations of natural phenomena, is an expensive luxury which should be supported only if it promises immediate pay-off in terms of practical applications for industry or medicine.

"The other attack comes from opinions held by a significant part of the younger generation: Science is distrusted as being the source of industrial innovations leading to further deterioration of our environment, to further destructive applications in weaponry, and to further developments in our society toward a world of Orwell's 1984. At best, they say, pure science is a waste of resources which would be better devoted to some immediate socially useful purposes.

"Both attacks are based upon a misinterpretation of the nature of science. Science is the cornerstone of our modern civilization in many respects. The effort to understand our natural environment is man's most successful collective enterprise in history. It has created new ways of thinking and new ways of life. It has thoroughly reshaped our mental and physical environment. The difficulties of our day are caused by the growing rate of technological change and by the growing expansion of technology. They do not stem from the failure of science, but from its unexpected strength. The numerous problems created by the rapidly expanding application of science can be solved only by pains-

taking investigations of the effects of industrialization and by a thorough study of the interrelation of many factors which determine our environment. To do so needs more basic science and not less of it. The careful analysis of the problems and the necessary measures of solving them will require more, not less, of the spirit engendered in pure research. We will need more, not fewer, people trained in the unbiased search of causes and effects.

"The scientists who are involved in fundamental research have always proved to be the best reservoir of manpower for tasks which require objectivity, innovative ideas, and imaginative approaches. We must not let the source of this reservoir dry up."

In this period of financial crisis in the universities, it is of the greatest importance to understand the dangers to the nation in permitting the great resources that have been built to erode or be dispersed. There has never been a time when the private sources of support for universities and for research have had a greater role to play in maintaining the continuing vigor and contribution of these scholarly activities. We have hardly begun in the great intellectual adventure of understanding nature and of controlling our environment. Let us not now lose our hard-won momentum.

*James R. Killian, Jr., who graduated from M.I.T. in 1926, began his lifelong career at the Institute of Technology Review, of which he was a distinguished Editor 30 years ago. He became President of the Institute in 1948, having previously been Vice-President and Assistant to the President during the years of World War II, and he was called to Washington as the first White House science adviser by Dwight D. Eisenhower in 1952. The paper, some of which was originally presented last winter in Dr. Killian's testimony before the Commission on M.I.T. Education, is reprinted with permission from the Proceedings of the Academy of Political Science, "The Corporation and the Campus" (Volume 30, May, 1970).*

*Of the design of some of Britain's numerous new universities, Professor Perkin writes: "The effect is to rehumanize the environment of learning and living, and bring it back to a scale which a peripatetic animal with a quick mind and a slow body can cope with and understand." This is Lancaster University's Alexandra Square.*



British universities, like their American descendants, are threatened by their changing environment. A wave of new universities is demonstrating how to turn change to their campuses' creative advantage

Harold J. Perkin  
Professor of Social History  
Lonsdale College  
University of Lancaster

# Fitting the University to Today's World

One man's challenge is another man's provocation.

In the universities of the 1970's the most hotly disputed question is likely to be whether the university ought to be fitted to today's world or whether the world ought to be fitted to the (ideal) university.

To most academics and students, the reformers and conservationists as distinct from the reactionaries and revolutionaries, the first is a challenge to be accepted with alacrity or reluctance. For them the university exists to serve society: to produce educated men and women with, if possible, a useful professional specialism, to take their place in the existing world, live useful lives, and help to make it a better or at least not a worse place to live in; to solve some of society's more urgent problems—whether scientific, aesthetic, social, or political—and to increase the world's stock of knowledge and wisdom by learning and research. Whether or not they wish to change the world, they recognize that the university must first fit itself to the world as it is, accept or at least understand its realities—such as their utter dependence on society for financial and moral support—and change or conserve it from the inside, by cooperation, example, and persuasion.

To others, the radicals and revolutionaries (I leave out the reactionaries, who foolishly imagine you can stay where you are in a Heraclitean universe by standing still), the second—fitting the university to today's world—is a provocation, a gratuitous invitation to fight and destroy. For them, the university has become an instrument of society's oppression of the individual and the "masses," the Procrustean bed on which it racks or cuts to size the intelligent young to fit its purposes, square pegs for square holes in the materialist economic machine. To change and humanize the monstrous machine you must first capture the university and transform it into an instrument of revolution, a microcosm of the ideal world on which the macrocosm can be modeled, the germ cell invaded by a benevolent virus which captures its DNA, manufactures a new RNA in its own image, and transmogrifies the whole organism.

Their idealism is admirable but their naïvete astounding. The anarchist principle of violent confrontation, to prove that all existing institutions including universities are based on force, is a platitude for simpletons. Whoever imagined that in the last resort any society or institution

would not defend itself against destruction, still more against a fate it considered worse than destruction? Any organism invaded by a virus will call up its phagocytes (the "pigs," the "fuzz," the police) to destroy the invader and may well prefer to die rather than be taken over. To be surprised at this, or to think that it proves all existing societies to be sick and febrile, is a mark of adolescence. The mature social physician, like the transplant surgeon, will seek to *persuade* the body politic to accept the necessary change, not to terrorize it into pre-emptive self-destruction.

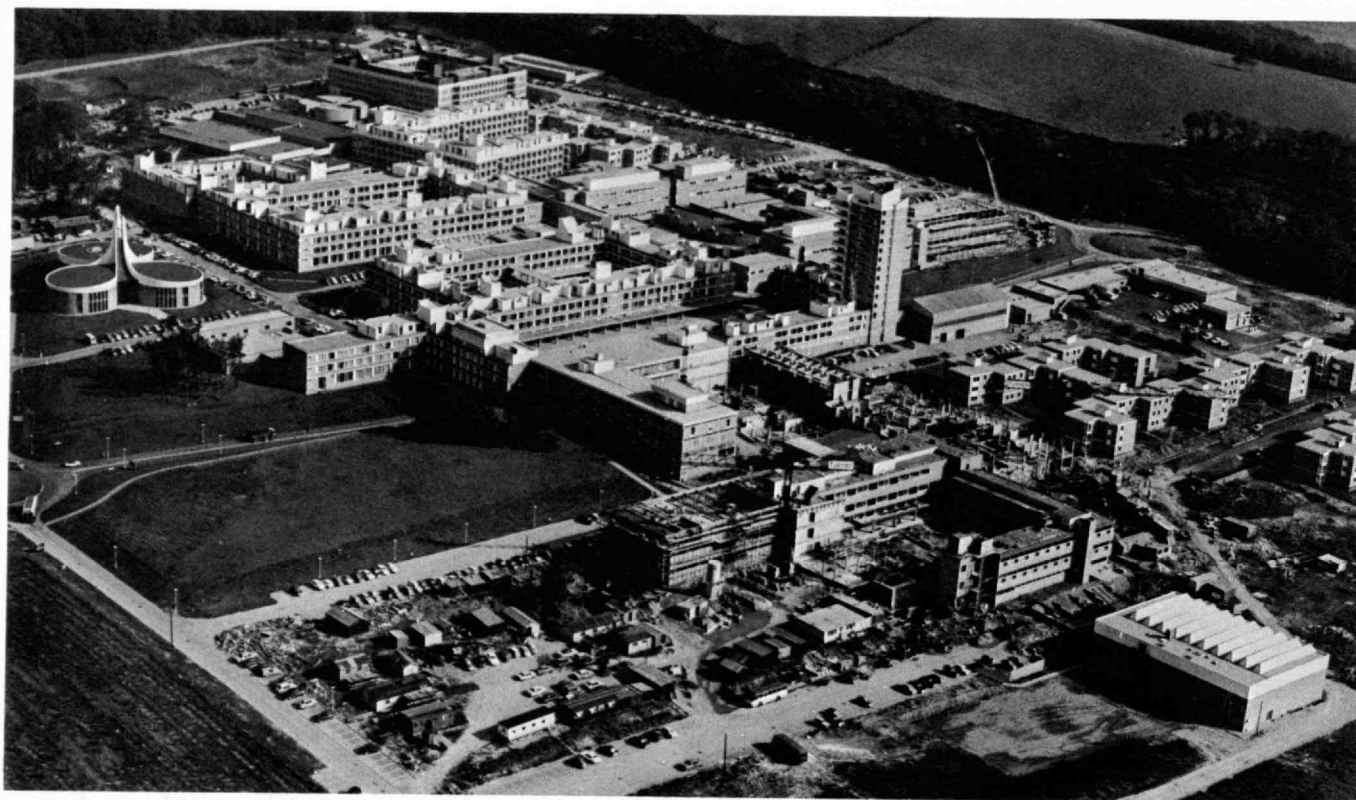
Still, there is nothing like a fever or a coronary thrombosis to persuade the patient to review his constitution and way of life. In Europe no less than in the United States, the events at Berkeley, Columbia, Cornell, Berlin, Paris, the London School of Economics, Essex, and other universities have persuaded a great many academics that the days of comfort and complacency are over and that a change of regimen is essential if healthy survival is to be guaranteed.

If anything, European universities are faced with more strenuous adjustment than American ones, since they are currently going through the explosive transition from an elite system for 10 per cent or less of the relevant age group to a system of mass higher education for 20 per cent or more, which the U.S.A. has already passed through and beyond. The 1960's have seen a doubling of student numbers in most West European countries, and most present plans envisage a further doubling during the 1970's. To cope with these numbers, ancient universities everywhere are bursting at the seams, with all the internal friction and strains which this implies; new universities are springing up—a dozen in France, 15 in Germany, a score in Britain, and so on—and there are new types of educational institutions—two-year intermediate colleges, polytechnics with emphasis on teaching rather than research, and, in Britain, the "open university" or "university of the air" which reaches a mass audience mainly through radio and television.

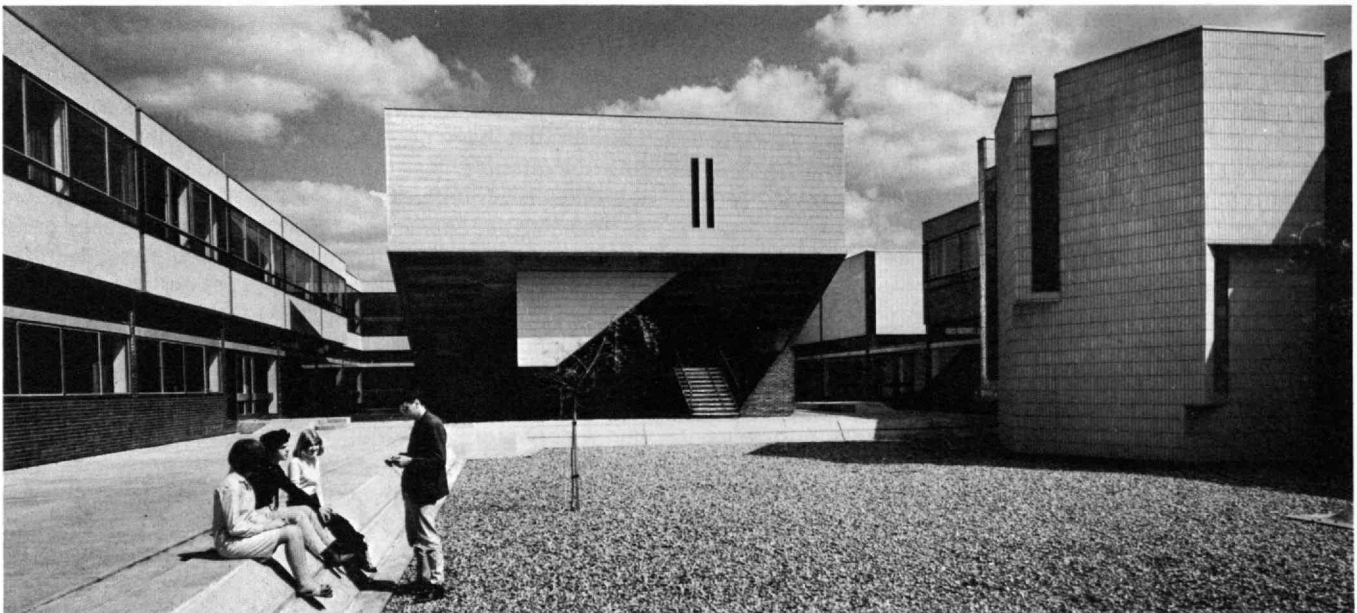
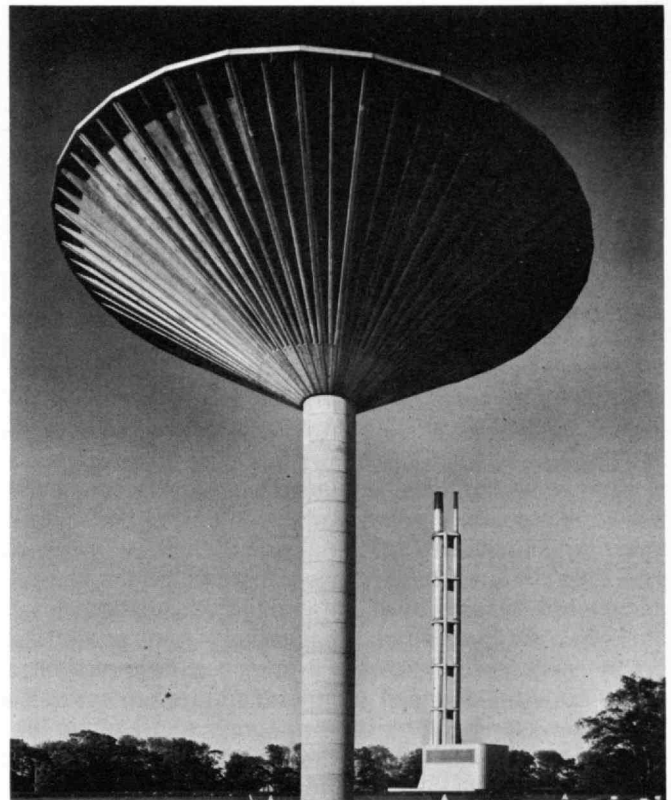
Established universities, especially in Europe, are tenaciously conservative institutions. This has often been their saving, indeed heroic virtue. In a political system which has always been much more unstable than that of the United States, the universities have often been the only rocks for liberty of thought and moral values to cling to in a raging antilibertarian sea; and when, as un-



# Fitting the University to Today's World



*"The integrated pedestrian campus is in a sense a return to an old medieval concept. . . . The essential principle is the segregation of pedestrian from vehicular traffic, so that . . . the university becomes once again a real, round-the-clock community of scholars." In the University of Lancaster (left) traffic is segregated vertically among long teaching blocks. The University of York illustrates the alternative "scattered pavilions in the park" concept (photographs show: below far left—Derwent College; below left—physics laboratories and lecture hall; at right—chemistry laboratories water tower and university boiler-house smoke-stack, which clearly were not neglected by the architects). Part of another new university—East Anglia—is shown below.*



der Hitler, Mussolini, and Stalin, even they went under, the lights went out indeed. Even in Germany, where the universities were and are organs of the state and academics civil servants, the great tradition, only temporarily suppressed by the Nazis, is still Wilhelm von Humboldt's "Freiheit von Vorschung und Lehre" (freedom of research and teaching). To conserve such freedom is surely a virtue, whether the threat comes from the old right or the new left.

### A Crumbling Gerontocracy

But the question may still properly be asked: Freedom for whom? In most European universities until very recently it meant freedom for professors only. When professors constituted the majority of university teachers, and learning and science were largely traditional, slow to change, and only marginally relevant to the needs of the world outside, this was perhaps justified. Three contemporary explosions have changed all that. The explosion of student numbers has vastly expanded the academic profession and brought into the universities a majority of nonprofessorial teachers, younger and often brighter and more in touch with the needs and realities of the world outside than some of the older professors. The information explosion, the exponential growth in the amount of new knowledge to be absorbed and digested in every discipline, has undermined the premium on age and experience and rendered obsolete the traditional continental (not British) forms of recruitment to the professoriate, by postdoctoral *thèse* or *Habilitation* lasting a dozen years or more. And the technology explosion, inside and outside the university—particularly in computers and educational aids—has passed many of the older teachers by and left them literally inferior to their younger colleagues. The old gerontocracy is no longer intellectually justified and cannot morally be sustained, and nonprofessorial representation on senates and faculties is now certain to come.

Still less can the old continental (again, not British) attitude toward students be maintained. The old, arrogant aloofness of the French or German professor, lecturing infrequently to overcrowded audiences and refusing to answer questions or organize discussion classes except for a few privileged postgraduates, is under attack. Students in Berlin or Paris interrupt, pass fly-sheets denouncing the lectures, demand tutorials and seminars. German students demand "democratization" and the "one-third principle": one-third representation

for professors, *Mittelbau* (nonprofessorial staff), and students on the *Grosser Senat* and *Facultäten*. French students in Nanterre, Rouen, and elsewhere have demanded and obtained staff-student committees to investigate the curricular and examination systems. British students are demanding and in many universities obtaining representation on senates and other governing bodies, and the National Union of Students has gone on record that even 50 per cent representation on some university committees is not necessarily enough. The Scandinavians, as usual, have with a minimum of resistance gone furthest of all, and in Finland they are contemplating student involvement in academic appointments.

If the established universities have, reluctantly and slowly for the most part, begun to fit themselves to today's more democratic and less deferential world, it is the wave of new universities in Europe which has led the van and pointed the way to further change. As Professor Herbert Butterfield, Master of Peterhouse, Cambridge, said at Keele, the first postwar new university in Britain, in 1961, "If there are to be radical changes or even interesting experiments, it would seem that these can emerge only in the newest universities of all. One of the most exciting features of the present-day educational movement is the special creative opportunity that is open to new universities, just where originality is urgently needed and older universities are too committed to existing systems."

### New Maps of Learning

Though they have not had a monopoly of innovation, the new universities, starting from scratch, have been freer than the rest to experiment with curricula, modes of assessment, academic and administrative organization, buildings and the physical environment, and, perhaps most tellingly of all, staff-student relations. The experiments have not all been successful, but they have all provided lessons for the rest of the universities in each country. O.E.C.D., the Organization for Economic Cooperation and Development based in Paris, has begun a series of case studies of innovation in higher education in member countries, beginning with Britain, France, Germany, and Yugoslavia, of which my own, on *New Universities in the United Kingdom* (O.E.C.D., Paris, 1969, \$7) is the first to be published.

Out of a plethora of examples, three types of innovation



in Britain which help fit the university to today's world are worth singling out: the integrated pedestrian campus; the new maps of learning; and the structure of staff-student relations.

The integrated pedestrian campus is in a sense a return to an old, medieval concept of the university as a physical entity, with all the buildings, including residential and other social facilities, within safe—literally safe—walking distance of each other. The essential principle is the segregation of pedestrian from vehicular traffic, so that staff and students can walk unmolested, making frequent, spontaneous, informal contacts, and the university becomes once again a real, round-the-clock community of scholars. Whether this is achieved by "scattered pavilions in the park" as at Sussex, Kent, or York, or by the linear or continuous teaching block principle with vertical segregation of traffic as at Essex or Lancaster, the effect is to rehumanize the environment of learning and living, and bring it back to a scale which a peripatetic animal with a quick mind and a slow body can cope with and understand.

The new maps of learning are more innovatory for Britain than for some other countries, since they were meant to deal with the peculiarly British problem of early and overspecialization; but they have wider relevance to a world in which, with the technology explosion, intelligent generalists capable of inventing the future and coping with it, who might have to change careers three or four times in a working lifespan, are more useful than narrow specialists obsolescent from graduation day. A common feature of nearly all the British new universities is the multi-subject honors degree—familiar enough in the U.S.A. and even in Scotland, but unusual in England itself; but the important consequence is the new academic organization to achieve this: the abolition of the old faculty system and the grouping of subjects into flexible "schools" or "boards of studies" so that existing disciplines shall not ossify in isolated departments and prevent new ones coming into spontaneous existence.

One by-product of this has been the rapid proliferation of the "business technologies," operations research, systems engineering, behavior in organizations, and the like, disciplines hitherto neglected in Britain and of great value in relating the universities to the modern world.

It is in structuring staff-student relations for creative collaboration and the avoidance of disharmony and unrest that the British new universities have most to teach, not least because they have experimented with diverse solutions. Though at the time of their foundation student participation was not a live issue, the new universities have led the way in granting (minority) representation on Senate and Council.

But it is at lower levels than these that the quality of staff-student relations really matters and where most problems can be defused before they become explosive, university-wide issues. The new universities, like most others now in Britain, have adopted a "moral tutorial" system—in addition to the academic tutorial

system of teaching in small groups—by which every student has a member of staff to whom he can go with any kind of personal problem; but even this is not the answer, as L.S.E. (and most American universities), which have such a system, shows. The answer, curiously enough, seems to lie in the structure rather than the attitudes and personalities concerned.

Those new universities which adopted the centralized students' union with a few elected but remote student officers to channel all problems and grievances to the central administration, like Essex, have had much more student unrest than the collegiate universities, like York, Kent, and Lancaster, which divide staff and students into cross-disciplinary groups of 500 or 600 responsible for a college building (also used for academic purposes) and its residential, social, and athletic affairs. The day-to-day contact between staff and students thus entailed seems to ensure a group loyalty and understanding which breaks down the "us-them" barrier which lies behind most student unrest. The advantage of the system is that it can be adapted to any size of university, colleges simply proliferating to accommodate the additional numbers, while a central federative student body elected from them deals with those few problems which affect the whole university.

If learning to live with each other in human dignity and fruitful cooperation is the most important task facing today's world, the university can indeed, if it wishes and structures itself for the purpose, become the persuasive exemplar. It may then have earned the right and the capacity to fit the world to the university.

*Harold J. Perkin is a social historian whose research has involved the effects of transportation technology and other parallel influences on the shaping of modern English society. He was educated at Jesus College of Cambridge University and for nearly 15 years was Assistant Lecturer and Lecturer at Manchester University before going to Lancaster as Senior Lecturer in 1965.*



*"Obviously the country needs them in the sense that they can make a unique contribution to the national welfare. The real question is, who will employ them, now and in the years ahead?" (Photograph taken in the laboratory of Dr. Bruce Wedlock, Electrical Engineering, M.I.T., by Leonard McCombe for Life Magazine)*



Doctorate engineers have traditionally made their careers in education and research. "Significant changes in existing utilization patterns" will be needed to right the developing imbalance between the growing supply and decreasing demand for graduate engineers

John D. Alden  
Director of Manpower Activities  
Engineers Joint Council

# Graduate Engineers— Who Needs Them?

A general lack of firm statistics dealing with the present, let alone the future, jeopardizes any effort to assess the utilization patterns for advanced degree engineers and to make reasonable projections of future demand for people with skills traditionally associated with advanced degrees. It is obviously dangerous to draw too many conclusions from too few facts. What I have to say about advanced degree engineers must be viewed as a more or less subjective interpretation of such scanty statistics as I have been able to find plus those straws in the wind I have observed.

Graduate degree engineers, particularly those with doctorates, are still a rather small factor in the overall manpower picture, both of engineers and of doctorates in general. This perhaps accounts for the poor statistics available on them. Of the entire Ph.D. population of scientists and engineers described in two recent studies, engineers constitute 14 per cent of one (National Science Foundation) and only 5 per cent of the other (National Academy of Sciences—National Research Council).

In the engineering profession, Ph.D.'s are an even smaller part of the total, ranging from only 1 per cent in the postcensal study by the U.S. Bureau of the Census to 5 per cent in the most recent National Engineers Register profile. The profession is being gradually enriched by a growing infusion of new advanced degree graduates, but even in 1969 only 6 per cent of the engineering degrees awarded were doctorates.

The rate at which the percentages are likely to change can be visualized by comparing the annual input of new engineering graduates (about 40,000) with the present total national employment of engineers (about 1,100,000.)

In total numbers, then, we are dealing with about 20,100 Ph.D. engineers existing in 1968 who have since been joined by about 3,350 new graduates. Published reports give varying figures on their areas of employment but are in general agreement that by far the majority are engaged in research or teaching. According to the N.S.F. study, 46 per cent are employed in private industry, 45 per cent in colleges and universities, 5 per cent in government, and 4 per cent elsewhere. Those employed in industry are primarily associated with research functions. A survey conducted by the

American Society for Engineering Education found about 12 per cent of the engineering Ph.D.'s in management. This study also disclosed that about half of those employed in private industry were engaged principally on government contracts, a proportion substantially greater than in the lower degree levels. The importance of this particular finding will become apparent in connection with estimates of present and future demand for engineers.

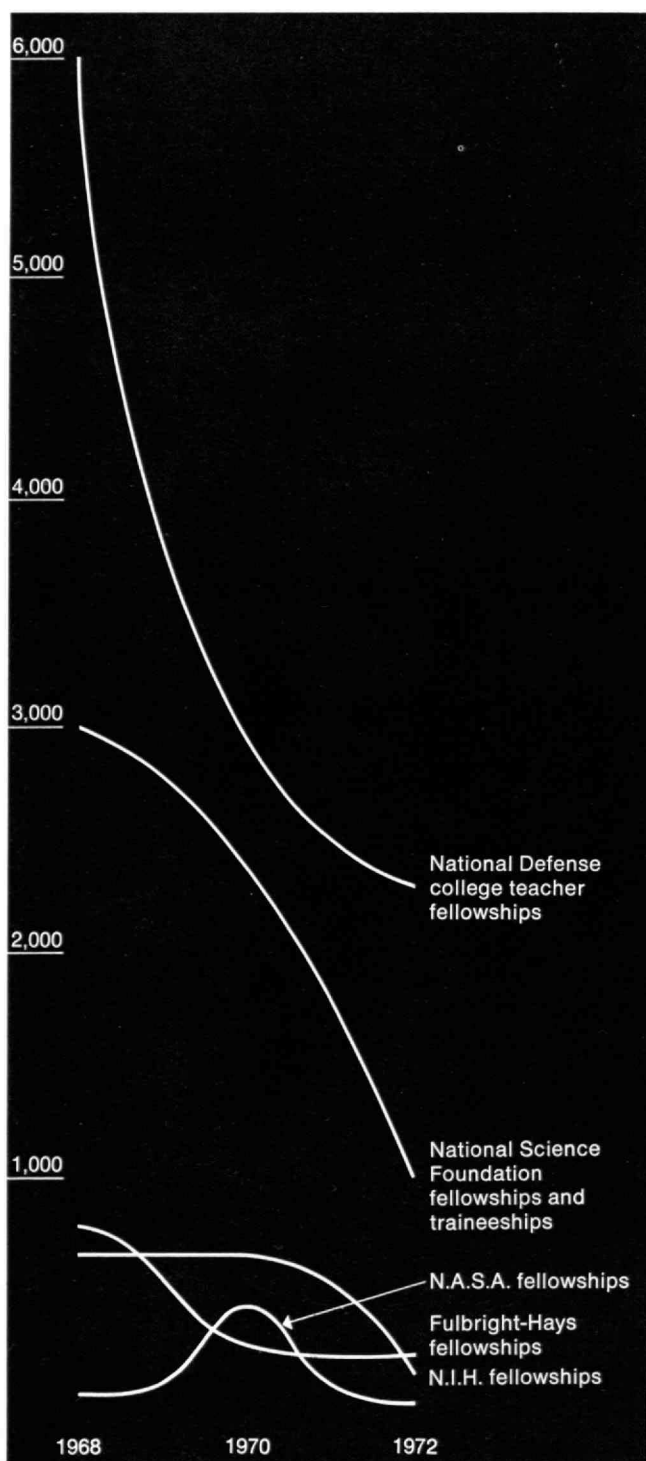
The statistical studies cited have produced but little information about the personal characteristics of Ph.D. engineers. In comparison with other engineers, they are more likely to have come from a well-educated professional or white collar family. In comparison with other Ph.D.'s, however, the opposite is true. Geographically they seem to be concentrated in the Middle Atlantic states. They are more apt to remain employed in the field of their degree than biological, medical, or social scientists. In general, the Ph.D. engineer "type" appears to be intermediate between the engineering and doctorate groups, sharing some of the characteristics of both.

The problem of measuring the demand for engineers in toto is so perplexing, in view of existing statistics and methodology, that it is perhaps reckless even to talk about the demand for Ph.D. engineers. Past surveys of demand conducted by the Engineering Manpower Commission of Engineers Joint Council have developed only rudimentary data, much of it relative or subjective in nature.

In the 1964 survey, responding employers reported the greatest difficulty in filling their previous year's hiring goals for new Ph.D. engineers—only 63 per cent of the desired Ph.D.'s were obtained, in contrast to 82 per cent of the bachelor's and 92 per cent of the master's. Note, however, that shortfall existed in all categories. This same survey disclosed a few signs of softening in the Ph.D. job market in the form of reduced hiring goals for physical scientists and mathematicians at this degree level in 1964.

Two years later, the next Engineering Manpower Commission demand survey revealed a different picture. Respondents reported that engineers were generally more difficult to hire than in 1965 but that the least difficulty was encountered at the Ph.D. level. Employers

Cleo F. Craig, Chairman of the Woodrow Wilson National Fellowship Foundation, says 1970 is the "worst year in years for graduate education." The chart below shows the decreasing numbers of first-year graduate fellowships available under six key federal programs. If there is oversupply of doctorates, it may be short-lived; but Mr. Craig insists that "we have too few rather than too many Ph.D.'s." (Data: Woodrow Wilson Foundation, from Editorial Projects for Education)



found it easier to hire new Ph.D.'s than even nongraduates to fill engineering jobs. Softness was evident in the research, metals, aerospace, and consulting groups, and in state governments. Demand for advanced degree engineers still exceeded the available supply, but the relative demand for the different degree levels had shifted markedly.

The 1968 survey showed a picture similar to 1966—i.e., one of an overall shortage of engineers. Companies fell short of their previous year's hiring goals at all degree levels yet hoped to hire more in the 1968-69 school year. Relatively, the demand for Ph.D. engineers was again weaker than for most other educational levels as shown by the following indicators:

	Per cent		
	B.S.	M.S.	Ph.D.
Shortfall in 1968 hiring goals	25	22	20
Increase in planned hires for 1969	26	28	18
Subjective index of hiring difficulty	100	66	47

What is the situation today? The Engineering Manpower Commission has conducted a new survey of demand, but the results have not yet been analyzed. Preliminary indications are that hiring goals for 1970 are down markedly in the aerospace industry and to a lesser extent in the electrical-electronics, metal products, machinery, chemical, and research and development industrial groups and in educational institutions. They are up in the construction and consulting, utilities, and federal, state, and local government groups. Overall, planned hires are down only 1 per cent from actual hires in 1969, but obviously the situation is quite unbalanced with respect to the different fields. In terms of total engineering employment, our figures show a slowdown in the growth rate to 2 or 3 per cent per year for 1970 and 1971 in contrast with the 6 to 7 per cent growth rates prevalent from 1964 to 1966. These estimates are not broken down by level of degree, so in looking ahead we can only make educated guesses on the future demand for advanced degree graduates.

Two recent studies have tried to gauge future needs and demand for this category of educated manpower. The National Science Foundation study mentioned earlier projected a supply of 350,000 Ph.D.'s by 1980 in contrast with demand estimates of 277,000 and 301,000 using two independent methods. The lower of these estimates assumed a "minimal" 4.4 per cent annual growth rate in federal research and development expenditures from 1968 to 1980. This same study hopefully concluded that "improved" utilization levels of Ph.D.'s would forestall a manpower surplus because "improvements in the present situation are quite desirable from a national point of view." I think recent events have cast doubt on both of these assumptions, at least for the period of 1968-1971.

A second new study, by the Commission on Human Resources and Advanced Education, has reaffirmed the oft-stated conclusion that we are faced with an overall, long-term shortage of engineers. With regard to engineering doctorates, however, the study has little to say. Its authors make the assumption that a bachelor's degree graduate can increase his productivity 50 per



cent through doctorate study but admit that "since there are no good measures of the comparative productivity of engineers at different levels of degree attainment, those percentages are hypothetical."

Is it reasonable to assume, as this study concludes, that "graduate training increases the person's potential productivity" in engineering? I do not know. There are some who think otherwise. Leo L. Beranek, in an address to the Engineering Manpower Commission (now printed in *Professional Engineer*), cited a study by M.I.T.'s Sloan School of Management that identifies master's degree graduates as the typical entrepreneurs responsible for the successful "high technology" firms spun off from M.I.T. since 1945; he went on to say:

"If those who terminate with a master's degree are the basis of our entrepreneurs, what happens to those who go on to earn their doctorates? This group is likely to be skilled in the verbal talents. The candidate sets up a mathematical hypothesis, gets someone else to devise an apparatus (or worse, buys one ready-built), runs some experiments to confirm his hypothesis, and writes a thesis full of integral signs. This is a physicist type of thesis. I do not mean to deprecate the conventional Ph.D. in physics; he will always lead the way to a whole range of new discoveries. But this verbal type of process often frustrates the engineer for life. It rewards the verbal-mathematical type of student and makes the investigative, manipulative type feel inferior.

"I have hired many Ph.D.'s and D.Sc.'s. They are great on Department of Defense and N.A.S.A. study contracts. But almost no new products or patentable ideas come from them. Give one of the Ph.D.'s a business activity to manage, and he often flounders. He has not learned to handle multidimensional problems—markets, product innovation, and personnel. He tries to reduce everything to the linear process—hypothesis, experiment, published paper. Once he adopts his hypothesis he is often not agile enough to shift his course as new data become available. His failure is costly to his employer and devastating to himself."

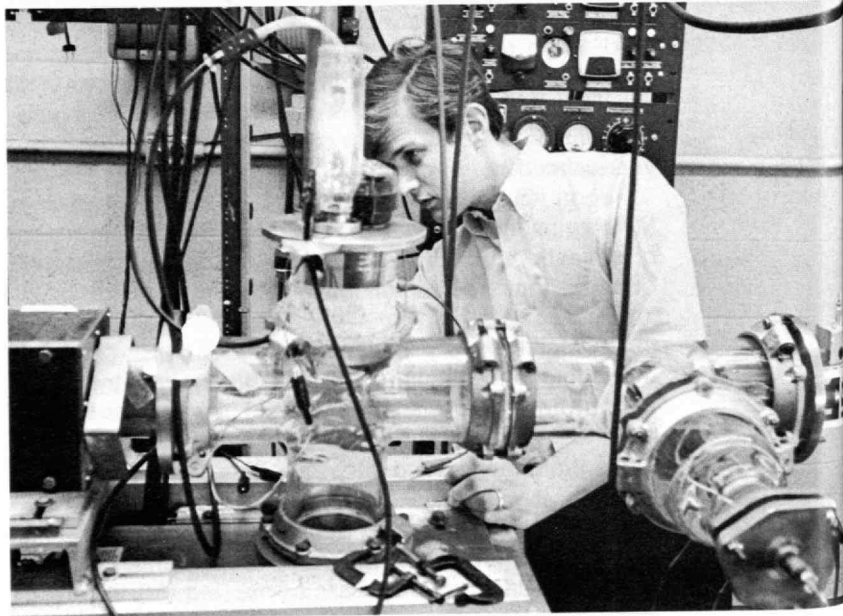
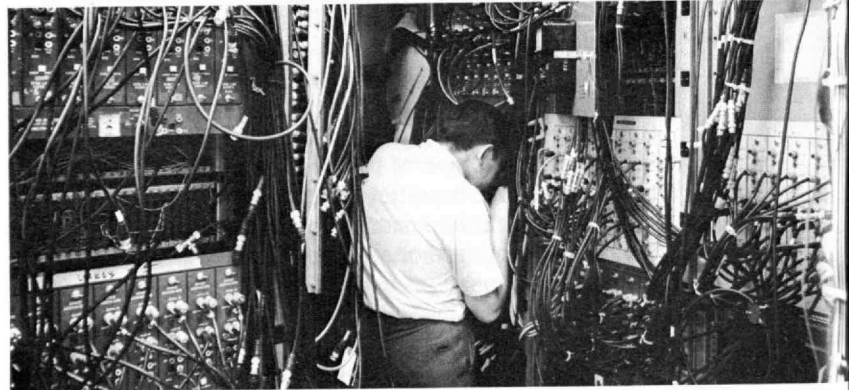
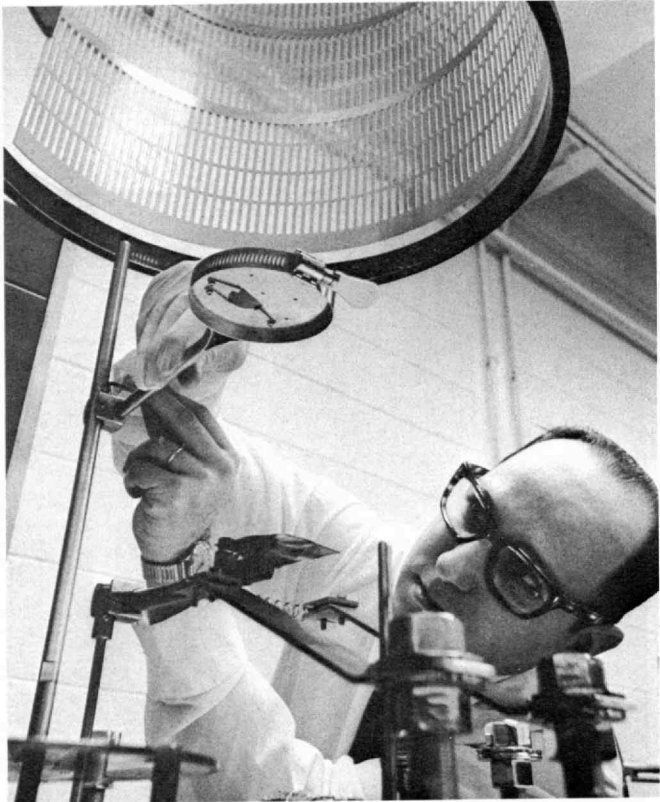
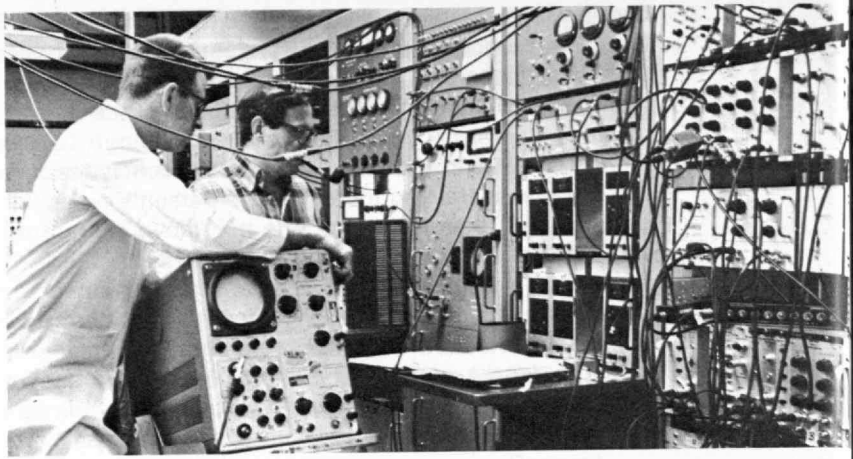
Who needs advanced degree engineers? Obviously the country needs them in the sense that they can make a unique contribution to the national welfare. The real question is, who will employ them, now and in the years ahead?

My own analysis is that even in 1968, with the exception of educational institutions, research and development organizations, and the chemical industry, the demand for Ph.D. engineers was proportionately less than the available supply. Ph.D.'s constituted 4 per cent of the total of new engineers available for employment but nowhere near this percentage of new graduate hires except in the three groups mentioned above. Since the chemical industry merely appears to be about in balance, it is evident that the present and future demand for Ph.D. engineers is tied directly to the fortunes of education and research. These are the areas in which all Ph.D. graduates are competing for employment. Therefore, in my judgment, the future prospects

of Ph.D. engineers are likely to be affected more by what happens in the Ph.D. market than by what happens in engineering employment.

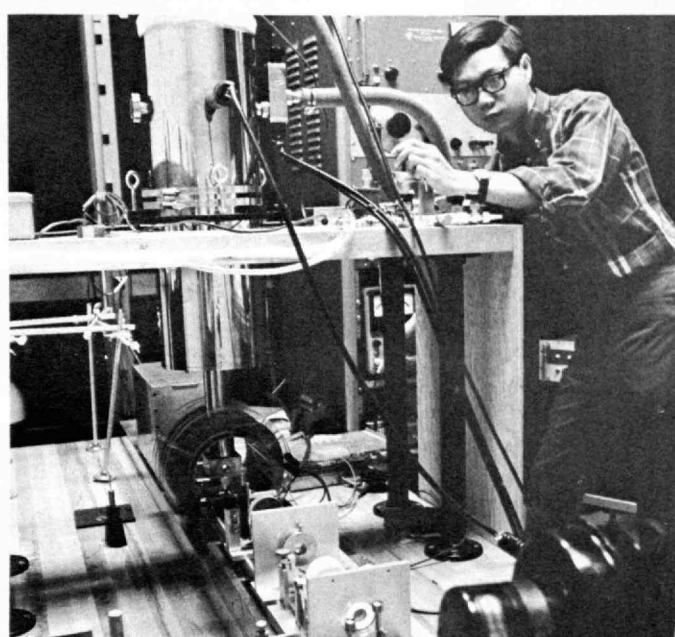
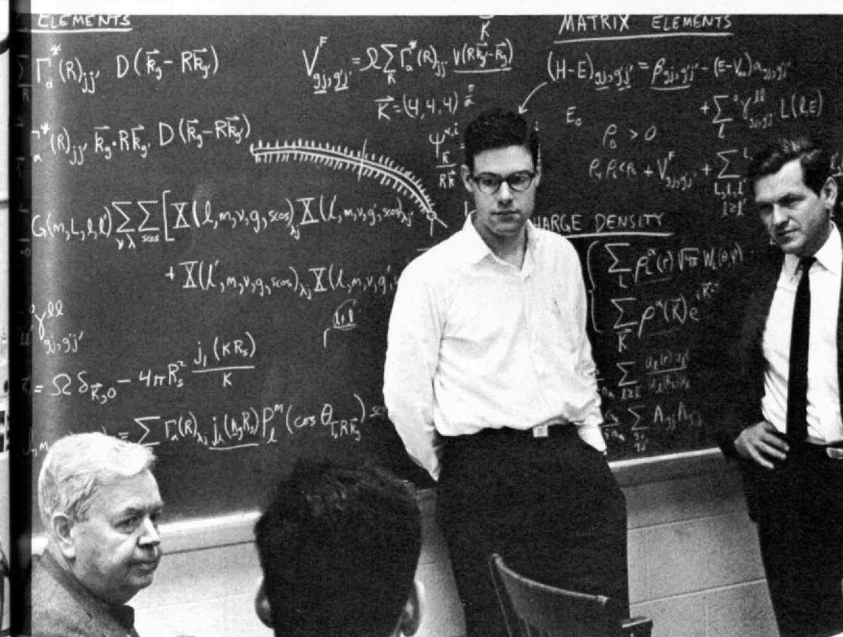
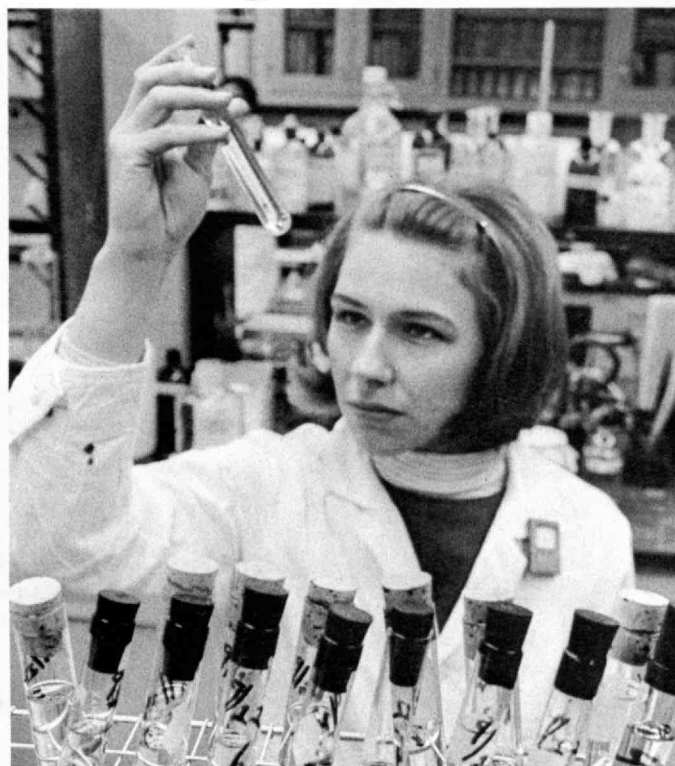
For the near future (1969-1975) the Engineering Manpower Commission's tentative demand projections show that engineering employment in colleges, universities, and research organizations is not expected to increase as fast as the supply of new doctorates. Industry may be able to absorb the excess because of its overall engineering needs—but only if the product is capable of meeting its requirements. Here the tendency previously noted to concentrate Ph.D. engineers on government contracts could have serious repercussions in view of actual and potential cutbacks of federal expenditures on research, defense production, and advanced education. For engineering doctorate programs, then, I think Dr. Beranek has pointed toward a redirection of emphasis that cannot be much longer delayed. For the more general problem of utilizing all the would-be Ph.D.'s now in our educational pipeline, especially those in fields other than engineering, it appears that significant changes in existing utilization patterns and possibly changes in national policies will be required to rectify the imbalances that are in prospect.

*John D. Alden graduated from M.I.T. in electrical engineering in 1949, and he has been for five years responsible for the activities of the Engineers Joint Council in surveying the supply of graduates in various engineering fields balanced against the changing demands for engineering manpower in government and industry. This paper was prepared for a conference on technical manpower convened at M.I.T. this spring, and it will be included in the proceedings of that conference to be published by the M.I.T. Press in the fall—by whose permission it appears in this issue of the Review.*



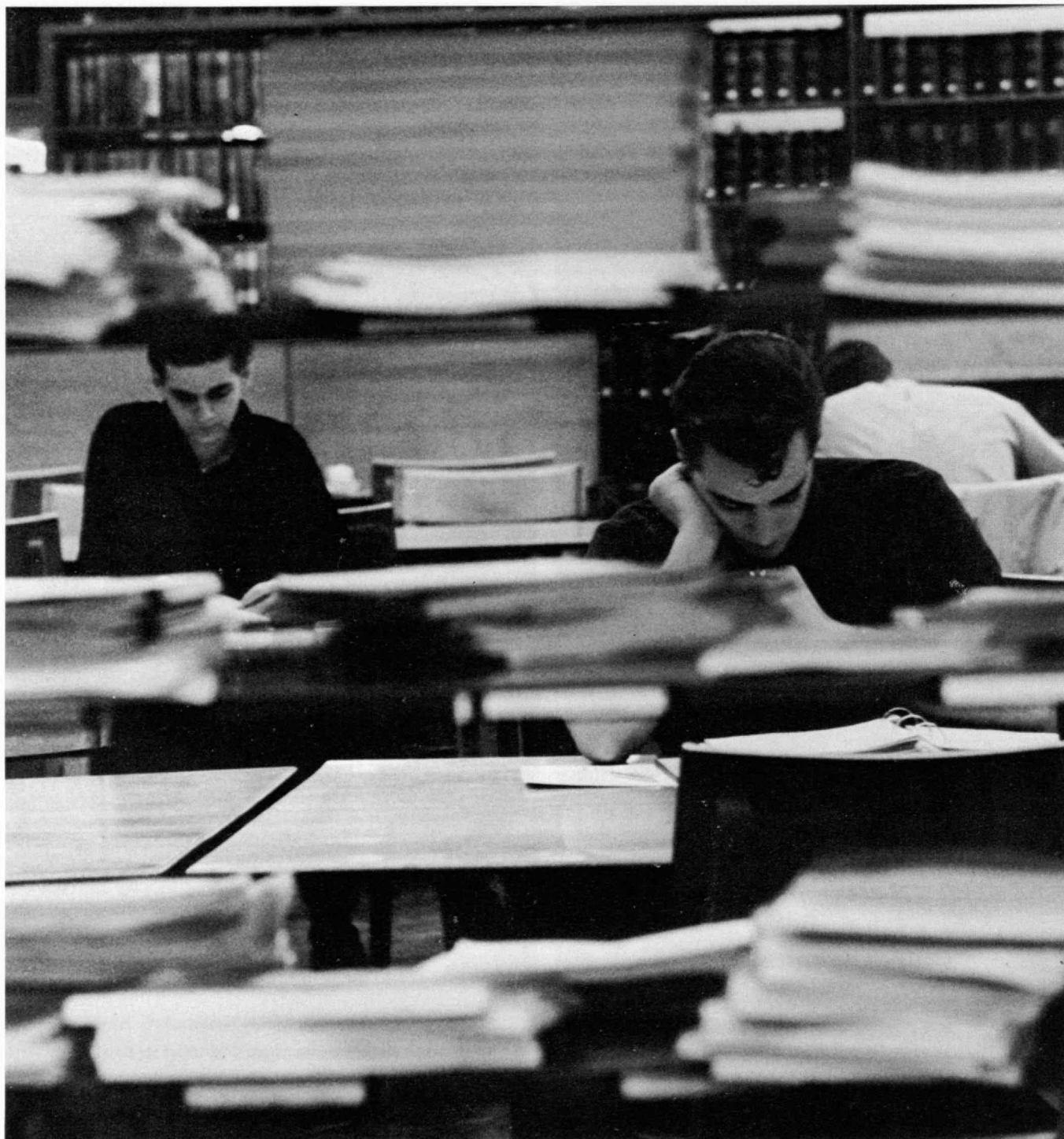
"The United States is becoming a research-dependent society," writes James R. Killian, Jr., Chairman of the M.I.T. Corporation, in this issue of Technology Review. "Almost every activity . . . is invigorated by research." And, he continues, "it is the special strength of university research that it is imbedded in the process of education. . . . Perhaps one of the most important factors in the American economy of today . . . has been the opportunity in our universities for science and engineering and management and the social sciences to work together side by side, each having an impact upon the other." (Photos: Ivan Massar from Black Star)

## Convergence of Engineering and Society





*"The engineering community today has an enormous opportunity to find ways within the proved, traditional engineering ethic of recognizing public concern for the misuse of technology and public desire for products and processes which do not degrade man's social and physical environment."*



# On the Convergence of Engineering and Society

The obligation of engineers to serve mankind has been a continuing point of emphasis by all members of the profession. Indeed, the concept is literally a basic part of most definitions of engineering: the application of science to solve the problems confronting man. The engineering profession is proud of its contributions; the products, processes and services now available to individuals in highly developed countries, particularly in the United States, are construed by engineers to have made life more interesting and more satisfying.

But now there is a new element of uncertainty, as more and more men become dubious about the consequences of technology. The engineer and his works are reviled instead of revered. Engineers can no longer take their image—and their mission—for granted. To their work must be brought a new dimension—the understanding of the social and behavioral scientist—in responding to the growing view that technology may be a blight on the earth as well as a benefit to man.

## The Philosophical and Ethical Basis of Engineering Design

The profession of engineering has always been associated with the solution of real-world problems. The engineering design process involves the creation of a capability to produce or the configuration of a physical product or process. Accordingly, engineers have typically been men of action and implementation, not men of theory and philosophy.

Mastery over nature has always been a controlling element of the engineer's work: nature had to be subdued, rivers to be bridged, dams to be built, buildings to be designed and constructed, roads to be carved out of wilderness. The tradition of engineering has always involved coercing nature to accept man and to provide him with shelter and mobility. The natural environment was the expendable resource, sometimes the enemy.

As engineering works grew in complexity, quality as well as quantity became a measure of achievement. Some structures failed; churches collapsed; bridges did not sustain the loads placed on them. The concept of safety began to play a significant role in the engineering design process. It was no longer enough simply to make a process or a product; the process or product had to be compatible with an enduring structure or service. Today the concept of a factor of safety is deeply ingrained in

the engineering code of ethics. An engineer is severely censured by his colleagues, as well as by society, if he designs a structure which fails in service. (But in his role as the designer of consumer products, the engineer's professional concern for safety may come into conflict with his management's need to respond to consumers' tastes. Hence one facet of the engineer's confrontation with the behavioral scientist.)

A second essential issue in engineering ethics has to do with least-cost solutions. As engineers were drawn more and more into industrial practice and as entrepreneurs called for innovation in product and process, the engineer was expected to provide workable solutions which were both safe and economical. Thus engineers became involved in corporate competition on the basis of the cost of products or services. The concept of least-cost solutions has now become an integral part of engineering education and practice.

Today, the evaluation of an engineering solution includes yet another measure—optimization based on relevant performance. After performance requirements have been fulfilled, safety assured, and designs optimized to achieve least-cost solutions, there remains one last parameter. Despite the technical elegance of current design practices, the public is increasingly unhappy about the consequence of technological change. Products, thought to be carefully designed, are found to pollute the environment. New systems are found to be in conflict with aesthetic values. Highways in urban areas are found to create social dislocations. For the first time in these terms, the engineer is directly confronted by the issue of ultimate social value.

But society fails to recognize that the engineer can only take into account explicit parameters—physical, economic, or regulatory. He is required ethically and sometimes legally to provide a least-cost solution compatible with existing codes. He cannot unilaterally adopt a set of parameters that will increase costs until he has been authorized to do so—until they have been accepted by the public.

## The Outlook of Engineers and Social Scientists

The engineer is a problem solver. He generally serves a client who presents a problem for solution. While he may sharpen the issues confronting the client, the engineer seldom is in a position to challenge the formulation

of the problem offered by the client. The education of the engineer may properly encourage creativity in terms of considering a large range of alternative options. But the central purpose of the engineer in practice is to respond to the interest of his client by submitting a single, optimum solution, expected to provide a least-cost response to a specified, felt need.

The social and behavioral scientist is educated in a different tradition. He is not expected to solve problems; he is much more concerned with the formulation of issues. He is not expected to arrive at a workable design based on the utilization of a given body of data; his professional success depends rather upon his ingenuity in the analysis of a given body of data.

The engineer deals with data much of which is expected to stay invariant with time. His goal is specified, and his solutions based on these data are expected to be repeatable. In the social sciences, a given body of data can be subject to radical reinterpretation with each generation of techniques for analysis and study.

Many social scientists, taking a theoretical view of their role and function, work not on the solution of a given problem but rather on an elegant characterization of that problem. They tend to abhor the rigor which engineers demand in the technical details of solutions to problems, and the apparent failure to recognize the consequences that may go far beyond the technology involved—consequences to which, in the social scientists' eyes, the engineers are either intentionally or naively blind.

On occasion, engineers come to social and behavioral scientists for help. Engineers may ask for views on the social response to a new transportation system or a new set of communication devices. They may ask for assistance in the design of a man-machine system—and in this case effective communications have been established, for today's man-machine design concepts are far advanced over those of a generation ago.

But the characterization of the use pattern of a new system is much less satisfactory to both groups. The social and behavioral scientists continue to decry the engineer's willingness to design systems considered to have negative social value—urban freeways, nuclear systems, and many civil engineering projects. To the engineer, they seem to be taking the naïve position that technology can remain undiscovered and undeveloped. He tends to insist that problems must be solved and knowledge used, to act and not to philosophize, to be impatient with social issues and intolerant of the apparently imprecise social and behavioral data.

### **The Problem of Interaction**

It is unfair to accuse the engineering community of being unaware of ethical, philosophical, and cultural matters. Engineering schools, for example, have incorporated into undergraduate curricula a substantial number of courses in the humanities and the social and behavioral sciences. But true interaction and understanding are not yet common. The undergraduate courses have not been integrated with design practices; there

are few projects that can be utilized for students of design as case demonstrations of rigorous approaches that recognize aesthetic and environmental considerations.

When government codes establish a maximum acceptable level of pollutants or a basis for recognizing and defining more general aesthetic criteria, of course the engineer becomes responsive. In this instance, he is not violating his traditional ethic of dealing with the least-cost acceptable solution. But when a community insists that a road be built two miles longer than necessary in order to avoid a particular grove of trees, or when a neighborhood requests that a sewage disposal plant be located several miles from its optimum discharge point in order to preserve a national monument, the engineer's ethic brings him into sharp conflict with the community conscience. None of his university education prepares him effectively to deal with the value judgments he must make in this situation. No modern techniques quantify the social indicators so that they may be taken into account in a design equation.

Social and behavioral scientists find the engineer callous and pragmatic. They are deeply concerned that the pace of technological change is outrunning the capability of man to accommodate that change. They range themselves on the side of the critics of technology, attempting to limit the rate of technological advancement.

There are approximately one million physical scientists and engineers at work in the United States but fewer than 100,000 social scientists. The physical scientists and engineers are employed largely by industry, the social scientists in academic and governmental institutions. There are almost no educational experiments under way to sensitize either group to the discipline and philosophy of the other. But these are an urgent need. Without some revolutionary change which will give social and behavioral scientists an insight into the ways in which they can provide data to influence engineering design, or without substantial compromise of engineers' preoccupation with least-cost solutions, there will continue to be a wide cleavage between engineering and social responsibility as understood by social and behavioral scientists.

Engineers are likely to find themselves the subject of increasing public criticism for their failure to recognize the social consequences of new technology. Legislation pending in the Congress of the United States for technology assessment or for a limitation on the utilization of new technology before its social consequences are understood will in fact lead to frustration and delay in the utilization of new technology. Engineers are increasingly being drawn into confrontations with public bodies and with groups of social scientists.

The responsibilities and opportunities of social scientists are changing, too. A recent report through the National Academy of Sciences to the governmental community on "The Behavioral Sciences and the Federal Government" has as its first recommendation: "That each major department and agency, with the support of the Office of Science and Technology and the Civil Ser-



vice Commission, initiate a staffing study to identify positions for which substantial training and experience in the behavioral sciences should be an increasingly important criterion for appointment, most especially positions involving policy planning, program evaluation and analysis, and research administration and operation."

The report points out that "issues of behavioral science research, such as the rights of privacy in relation to research, have been the subject of study" by groups under sponsorship of the Office of Science and Technology or the President's Science Advisory Committee. And, says the report, "many technological problems examined by O.S.T., P.S.A.C., and the Federal Council have been infused with economic, social, political, and legal elements. In such cases, O.S.T. and P.S.A.C. have made use of behavioral science resources, but on a limited ad hoc basis."

The report emphasizes that, in the new fields of urban development, public health, and economic and social development broadly, it is essential that programs "utilize and relate knowledge from all of the sciences. It would be unrealistic and mistaken to separate the impact of the behavioral sciences from that of the physical and biological sciences."

Yet the problem of communication between people in the physical or engineering sciences and those in the social sciences remains formidable. Their traditions of education are different; their approaches to problems are different. Engineers tend to be conservative politically, absorbing the attitudes of the industrial environment in which most of them work. Their professional institutions have been reluctant to become involved in matters of public policy. By contrast, the American Political Science Association has, for example, a program of Capitol Hill interns under which it supports several dozen bright young men for a one-year term of service with individual senators or congressmen or as a part of a congressional committee staff. There are essentially no engineers serving with the Congress in this capacity, learning the processes by which government takes account of emerging technology and translates it into a public or legislative response.

The high degree of empiricism with which the engineer approaches his problem—designing, testing, iterating the design, testing, and so on—is not deeply understood or recognized by social scientists. They have tended to assume that an engineer starts with a basic concept and immediately proceeds to a final design. The opportunities for taking other variables into consideration during the iterative processes of design have not been recognized.

There are a few current instances in which engineers and social scientists are attempting or have attempted to work together. In the design of the new city Columbia, engineers were concerned with the flow of goods and services and with the physical configuration of the city. But social scientists were used as consultants to give some insight into the social structure and its demands for goods and services. Currently, in Baltimore and in Cleveland, transportation systems are under study by

engineers and social scientists in the expectation that the design can minimize negative social consequences and at the same time be technically advanced.

### **Toward Common Cause**

Social and behavioral scientists have recently been attracted increasingly to the power structure of government, and it is reasonable to expect in the near future a much higher concentration of social scientists in key policy positions. They will insist on some redirection of technology, advocating greater controls on engineers' value judgments. Such influences have already resulted in action on automotive safety and pressure for more attention to issues of environmental conservation and pollution control.

No institution currently exists in either the public or the private sector to promote a deep, continuing interaction of engineers and social scientists. A multidisciplinary group in engineering and in the social sciences or even an engineering-social science group to meet together regularly for the consideration of problems of technology and public policy has been proposed, but these ideas have not yet come to fruition.

In time, some new institutions may emerge; but their sources and form can only be dimly perceived at the moment. Younger engineers are more sensitive to public issues; the experienced social scientists are steering their professional community into involvement with government.

The engineering community today has an enormous opportunity to find ways within the proved, traditional engineering ethic of recognizing public concern for the misuse of technology and public desire for products and processes which do not degrade man's social and physical environment. As a beginning, engineers must recognize that they are able to offer alternative solutions to design problems that will show clearly the costs and choices associated with the better fulfillment of aesthetic and social concerns, leaving the public to decide whether the increased costs can be tolerated. This stage alone may lead to action by engineers and social scientists to make common cause—a new opportunity in which all men could rejoice.

*William James Harris, Jr., a graduate of Purdue University and M.I.T. (with degrees ranging from chemical engineering to metallurgy) was until recently Assistant Director, Technology, of the Battelle Memorial Institute's Columbus Laboratories. He joined Battelle in 1954 as Assistant to the Director, after three years as Executive Secretary to the N.A.S.-N.R.C. Materials Advisory Board. For the past two years Dr. Harris has been President of the Engineers Joint Council; last year he was chosen to serve as secretary and staff director of a Presidential Task Force on Highway Safety. The Association of American Railroads, of which Dr. Harris is now Vice-President for Research, is currently enlarging the scale of its research projects.*

"Must things really be made so hard for a woman to succeed in science? Must she be made at 40 to reconquer the knowledge and confidence so naturally hers at 20? Is there a better way?"



Major changes in our mores and social system represent the most drastic of several proposals for giving women roles in science equivalent to those open to men. Continuing education or "retraining" offers a more immediate and practical option

Miriam Lipschutz Yevick  
Associate Professor of Mathematics  
Rutgers—the State University

# Some Thoughts on Women in Science

Various of my friends are, as I am, women in science. We have been engaged for the last 15 years or so in careers of teaching, research, or industrial work mixed with part-time housekeeping. Although our professional lives have not run the straight course of our husbands', mostly scientists as well, our work has not suffered from any prolonged disruptions. Yet each time we meet, our men mostly talk science while we usually linger on the subject of "women in science." What has gone wrong?

## A Contrast in Careers

Recently I attended a meeting of women over 50 with college degrees, some in the sciences, from first-rate schools. They had not led useless lives; most had succeeded as mothers and wives, and now, through a philanthropic organization, they were helping young girls in educational endeavors. Yet their intellectual pre-occupations had sunk to high-school level. I read in the hearts of many of them the tragedy of an ambitious, keen young mind, bright and awakened some 30 years ago, now wrapped in mothballs and gone to sleep, encouraged to do so by the stupidity of society.

What happens to the bright young man interested in science? He has already shown this interest by early high school. It is hailed and encouraged by parents and teachers, and when he graduates a preliminary future course has been charted for him. Between 17 and 21 he acquires solid undergraduate training, supplemented by individual scientific reading. Social life is often neglected. As a graduate student, he will increase his competence and deepen his insight, assist in the laboratory or in teaching, do his first piece of original research, and obtain a Ph.D. Now he enters the highly competitive industrial laboratory—or the academic world combining teaching with research; or, if he can manage on little (or rather, if his wife and children can), he will live on various fellowships for some years. The years between 25 and 30 are usually the most crucial in achieving mastery in the field and establishing reputation as an original scholar.

Our male academic scientist rises from instructor to associate professor and full professor. The years from 30 to 40 will usually see a steady stream of original contributions and publications as the scholar and scientist "cashes in" on the years of concentrated study which have preceded. After 40 his original work may continue at the same or a slightly slackened pace,

or he may turn to administration, slowly settling down to a somewhat more leisurely existence and helping the younger generation to become creative scientists in turn.

An occasional courageous male scientist will at about 40 break with his past work and launch into some new field, switching from physics to biology or mathematics to philosophy, and make surprising or even outstanding contributions in this new activity.

Two characteristics stand out in the careers of successful male scientists: first, a single-minded devotion to a plan of life, the life of a scientist, chosen early and strictly adhered to until middle age, at least; and second, the statistical certainty that years of single-minded concentration will yield a harvest of creative ideas, of superior competence, and of outstanding excellence—even greatness for some.

But let me quote two opinions I have heard my male colleagues express. First, "great work in science is done only by young men not yet 30. After this the mind moves in set tracks and truly original ideas fail to emerge. Working drive too begins to lag." Second, "there have never been women scientists on the level of the greatest, such as Bohr, Darwin, Fermi. Worse, with rare exceptions women do not (and will not) make outstanding contributions to science. The reason, most likely, is biological."

Are these true?

## Women Scientists at 20: The Path Ahead

At a conference at the Massachusetts Institute of Technology on women in science several years ago, some 250 girls sought guidance and encouragement in pursuing the careers they had chosen—no doubt against much opposition—in the face of skeptical looks and pronouncements, at the cost of self-denial of social life and husband-hunting in order to keep up.

They were outstandingly able, determined, and self-reliant. They were addressed by a number of eminent people, a few of whom were women who had managed to combine successful careers in science with marriage and motherhood.

The keynote speaker stated: "Before all, a woman wants



The total enrollment of women at M.I.T., shown in the chart, has increased steadily in the past 50 years and spectacularly in the past 10. Of women students at the Institute Emily L. Wick, Associate Dean for Student Affairs, has recently written as follows; the paragraphs are extracted from a report proposing a major new increment in the number of women admitted in each M.I.T. undergraduate class.

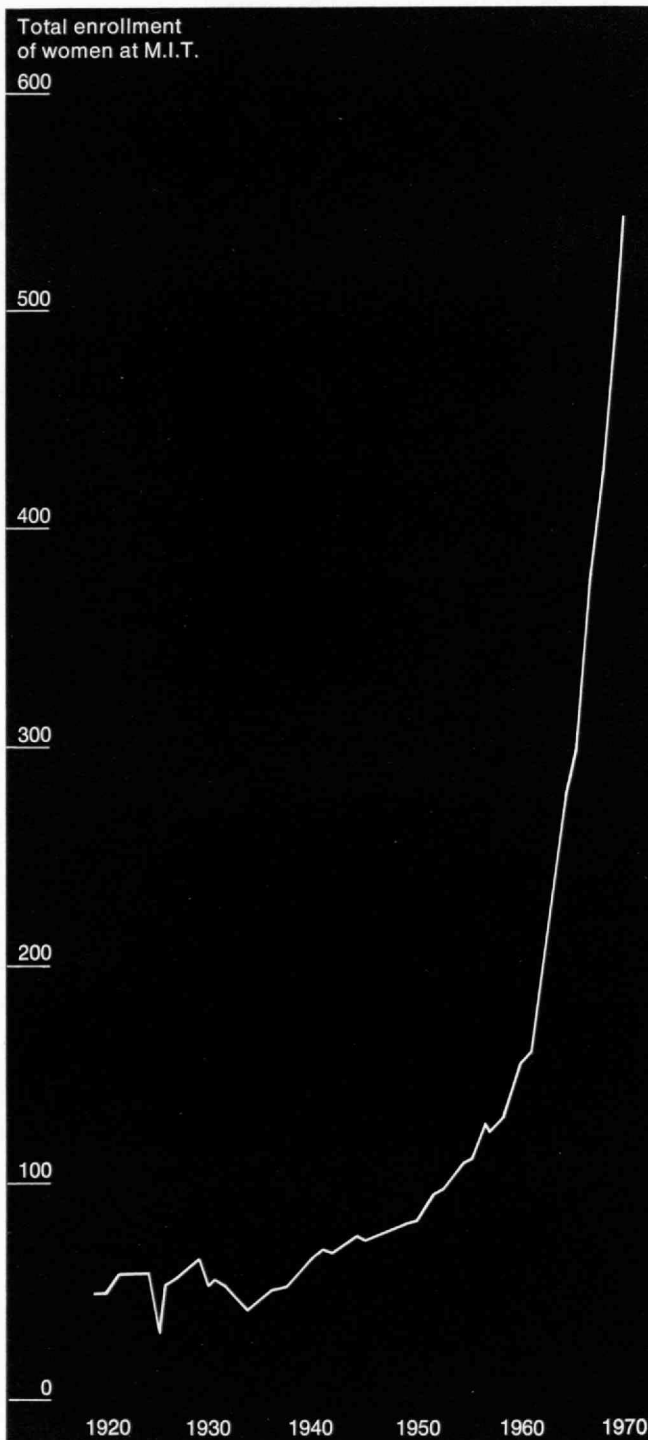
"M.I.T. has had women students for about 100 years. The first entered the Institute in 1871. By 1887 25 were enrolled. In 1895 6.3 per cent of the student body were women in a total enrollment of 1,187. This percentage was not reached again for 74 years, when in 1969 women accounted for 6.7 per cent of the student body.

"Since 1963, when McCormick Hall opened, the number of M.I.T.'s women students has more than doubled; if one looks back 10 years the number has almost tripled. During this period the girls have had an ever-increasing influence on the academic and social tenor of the community and have become accepted as first-rate contributing members of the student body.

"Until the Institute could commit itself to educating women in significant numbers, and could provide suitable living conditions, coeds were not overly 'successful.' Though numerous individual women were outstandingly successful, relatively high percentages of coeds were disqualified and relatively low percentages received S.B. degrees. As a group, they were quite like the girl in the rhyme: 'When she was good, she was very, very good; but when she was bad, she was horrid!' No one was, in fact, horrid. However, academic difficulties resulted, not from intellectual inadequacy but from general environmental and emotional incompatibilities.

"The recent academic performance of women students, as measured by cumulative ratings at graduation, is excellent. Between 70 and 95 per cent of the women in the classes of 1963 through 1969 had ratings of 3.5 or above. From 33 to 57 per cent had ratings of 4.0 and above.

"The success of the Institute's women students both on campus and as alumnae lends strong support for increasing their number. In 1960 Julius A. Stratton, then President, described Mrs. Stanley McCormick's gift of a women's dormitory as 'an unprecedented opportunity to advance the professional development of our women students. Women have made substantial contributions to scientific and technical progress in the past, and today there are more opportunities for girls in the scientific professions than ever before. Women's potential for achievement in these fields represents one of the greatest latent resources of the country.'"



to be the affectionate companion of a man and the mother of children." I wonder how many of the girls, if they agreed, would have the persistence to maintain their interest and work. What would the future hold for them?

I think of some typical cases I have known personally.

Case A studied chemistry and received a Ph.D., and she was married to a biologist shortly before obtaining the degree. They moved to a small town in which he was offered a good academic job. She was only able to find a position in a chemical laboratory in a field of minor interest to her. After four years, the husband advanced to a higher level at a better university. Mrs. A took a job at a girls' college at a rank and with working conditions far inferior to her husband's. A year or two later she had her first child, and at the same time she obtained a research grant. Soon she found it impossible to combine a heavy teaching load with research and family obligations. She now holds a part-time, ill-paid, temporary teaching job at another school and tries to squeeze out some time for research at a snail's pace.

Case B, a brilliant graduate student in science, married in her second year of graduate school and had three children in the next three years. She devoted several years to her family and then, with the cooperation of her husband, returned to pick up her graduate studies. Unfortunately she was unable to complete her thesis in the allotted time. The family moved once more and Mrs. B took a part-time teaching job, while her husband rapidly rose in rank. After a number of years she decided to try for her Ph.D. once more at the present location. After updating she completed her course work and started on a thesis. After she had completed one year of research her husband was offered a top-ranking job at another, far-away college. Mrs. B has given up at this point.

Both Mrs. C and her husband hold Ph.D. degrees in physics, and both obtained jobs in neighboring cities of a big metropolitan area. Mrs. C has maintained an academic career and continued her research, doing good work. They had their first child when she was well past 30. Now Mrs. C is tired and harassed; the disruption in a well-established life pattern is very difficult to adjust to. Presumably she will find a housekeeper and be available to her child about as much as her scientist husband.

Mrs. D and her husband obtained Ph.D.'s simultaneously, she in mathematics. He took an academic job, and she decided to stay home and do research on her own. Over the next few years she published several good papers and managed to do some quiet and deep thinking. She feels that this period of development was possible because she was *married* and hence did not have to earn a living. The arrival of a child created the need for more money and Mrs. D had to take a job with an excessive teaching load. Now conditions have gradually improved so that Mrs. D is spending a fair amount of time with the family; but she has pitifully small amount of time left for research or thinking about mathematics.

Mrs. E is a woman scientist who has reached the top. She found it necessary to live separately from her husband for many years and to see him only on weekends, an arrangement which did not harm their fine relationship but left their youngster at loose ends.

Mrs. F, a woman physicist from a very wealthy family, has four children, excellent and numerous help, and works happily part-time in research.

### Continuity the Main Problem

These are the kinds of prospects we can set before girls entering science. Unless they are exceedingly fortunate, they seem always to have to settle for second best. If their interest in science is intense, they seem destined repeatedly to suffer abrupt discontinuities in their endeavors and uncontrolled interruptions in their thinking. Only the toughest can hope to survive.

If the success in science requires an almost straight life course from which few deviations can be permitted, the woman should be judged not after the damage has been done, from the point of view of the prejudiced male, but rather one should ask: How, if at all within our present social organization, can we create conditions under which numbers of women may make outstanding contributions to science?

### Women Reentering Science at 40

One route may be suggested by Dr. Mary Bunting, President of Radcliffe College and a former Atomic Energy Commissioner: "I am willing to place a bet on the woman past 40 who returns to scientific work."

Join us on any weekday morning at a class of the Program for the Retraining in Mathematics of College Graduate Women\* at Rutgers. Some 20 housewives, from 25 to 60, are reviewing and updating mathematics they learned years ago, before their intellectual curiosity had been dulled by domestic duties. The atmosphere has the freshness of the undergraduate course; if anything, the students are livelier, more intent, and more keenly competitive.

"Postulates for a field," "closure," and "cardinal numbers" are words tossed back and forth. Gray-haired ladies write abstract symbols on the blackboard, two

\* Now defunct for lack of funds

very glamorous women argue a point, and everybody participates. In the Computer Programming course, it is nearly impossible to tear the women away from the machines.

Renewed enthusiasm has entered the lives of these women. They enter mathematics teaching, where the need is acute, or such fields as programming or industrial statistical work. Some courageously go on and pursue a Ph.D. and further research. The work of these women is far above average.

As working women, they are given the highest praise by employers. Many would have been the equals of men had their lives followed similar patterns. Here are some samples of what they write or say: "When my kids scream, I construct an abstract field in my mind and I see the situation in a different perspective. Having mathematics to think of again adds a new dimension to life at home." "Your courses have restored my confidence in my willingness and ability to study again. I do know that my husband is as proud of me and takes as much interest in my career as I have always taken in his, and this makes a wonderful feeling of mutual interest and respect." "Even now the road is not always clear. I would love to teach in a college, but I have to put brakes to my enthusiasm for my family's sake." "My husband has been transferred again and I must once more look for another job."

### **Creativity and Age**

What can we expect of this new group of retrained women scientists? Their minds are not stale from established ideas pursued for too many years; rather, after the rust has been scraped away, their training, interest, and intellectual drive may be level with those of the recent, bright college graduate. We do not have enough data on the creative abilities of men or women whose major intellectual development occurs late, yet could it not be that, given four or five years to acquire the competence of a Ph.D., some of these women will at 45 display creative vigor similar to that of male colleagues some 20 years earlier?

Since generally great scientific work is done over a relatively short time, enough years are surely left in our life span for such ability to realize itself. Where the male slackens at 40, the woman whose mind has been frozen for 15 years may perhaps be reborn and only begin.

But must things really be made so hard for a woman to succeed in science? Must she be made at 40 to reconquer the knowledge and confidence so naturally hers at 20? Is there a better way?

For example, could a different social organization provide first-rate nursery schools on a large scale, desirable communal eating facilities near home, pools of housekeepers or baby-sitters, and generally the building of more integrated communities from the point of view of combining work and living?

Or could the education of a future woman scientist be accelerated from the start so that she might obtain a

Ph.D. degree by 19? Thus the 20-to-25-year-old period of the woman's life could coincide with the 25-to-30 one of her male colleagues, so that she could establish herself and "cash in" by her middle 20's. She would still be young for marriage and flexible enough to rear children. She could return to the field by her early 30's. With a backlog of reputation and a well-established position, the interruption would not amount to much.

Continuing education probably represents a more realistic alternative. Rather than pursuing a crash program or turning over her family responsibilities to a communal organization, a woman might from the very beginning assume that her career will differ radically from that of a man and hence plan to spread it out over a long time, combining college studies and child rearing yet maintaining a continuous program of studying for a degree and doing research until her children are older. Thus she might be ready with a Ph.D. by her middle 30's, at which time she could devote herself fully to her work.

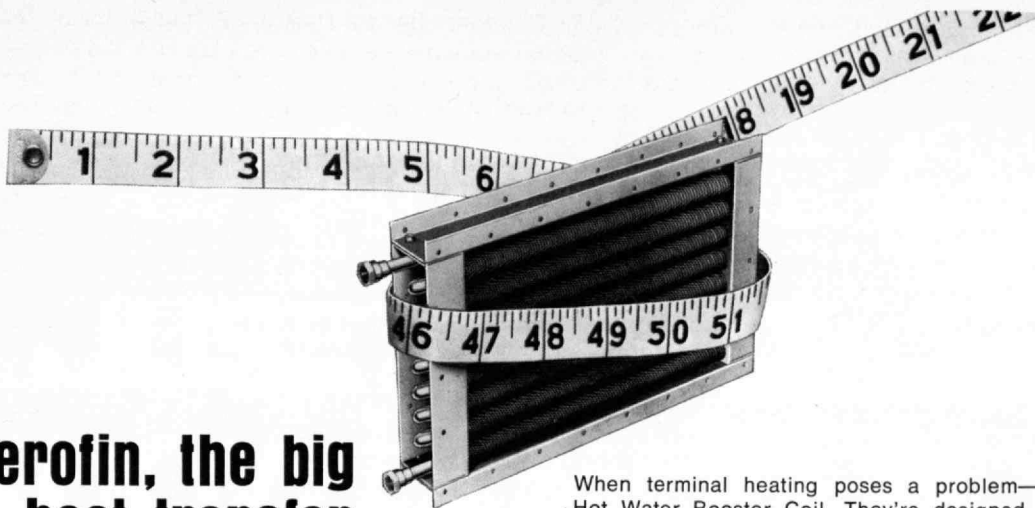
This solution is little-by-little becoming more feasible as colleges recognize the necessity for graduate programs geared to married women's needs and as part-time research opportunities are becoming more widely available.

### **The Future Society**

If there was a potential Fermi in the audience at the M.I.T. conference, what are the chances of her greatness unfolding itself? The problem will find its real answer only in a changed society. Women's progress toward part-time study and jobs may be met halfway by reduction in working hours and increased leisure and education for all, resulting from automation. As the myth of the holiness of full-time work dissipates, men in science, too, might perhaps relax a bit more. Instead of exhausting their creative ardor in a span of 10 or 15 years of high-pressure work and then spending the remainder of their time as administrators, can men and women alike spread their creativity over the whole of their life spans and mingle work in science with the responsibilities of family life?

*Miriam Lipschutz Yevick, born in Holland, majored in Physics at New York University, and obtained Master's and (switching to math) Ph.D. degrees at M.I.T., where her husband obtained his doctorate in the same year. She has combined married life with, in turn, private research, post-doctoral research at Maryland and Columbia, and posts at City College, Adelphi College and finally Rutgers, where she has been an Associate Professor since 1963. Dr. Yevick has published a number of papers on probability theory. She was Director of Rutgers' Retraining Program for Women in Mathematics and Science from 1965 to 1969.*





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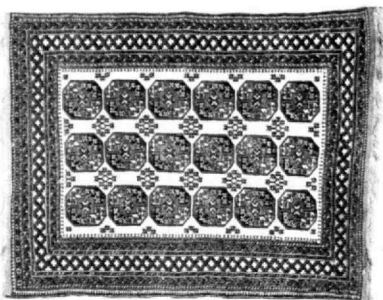
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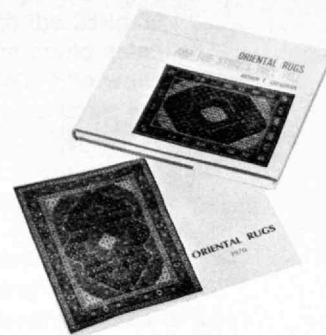
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# Trend of Affairs

## The Well-Qualified Job Hunter . . .

There are as many views of the shortage or nonshortage of scientists and engineers in 1970 as there are viewers—and fields to be viewed.

This year's physics Ph.D.'s can tell some disturbing tales of form-letter rejections from obscure educational establishments, and they have little respect for the National Science Foundation's sage advice against paying undue heed to mere anecdotal information. Indeed, there is a feeling abroad that statistics about the years before 1969 bear little relation to what is happening to the graduates of 1970.

Philip Abelson, Editor of *Science*, speaking at an M.I.T. conference on manpower problems sponsored by the N.S.F. and the Commission on M.I.T. Education late this spring, described the present employment situation for scientists and engineers as a "dislocation"; in the universities and in Washington, he said, there is a tendency to minimize this dislocation—which merely delays action. But the fact is, he said, "they're having a rough time out there."

As to employment prospects in universities, Dr. Abelson reported that in his speaking trips around the country he had not found a single private university not in serious financial trouble. Some, he said, are taking on no new staff at all.

Mrs. Susanne Ellis, in research for the American Institute of Physics which Dr. Abelson believes is "one of the best recent studies," confirms the impression. Last year, 52 per cent of job-hunting Ph.D. physicists sent applications to 10 or more potential employers; in 1967 only 29 per cent of the job seekers had to send out so many resumes. (Figures for 1970 are not yet in.)

A recent Institute of Physics announcement assumes, as common knowledge, the "oversupply in recent months of qualified Ph.D. physicists in relation to available jobs in universities, industry, or government," and goes on to quote Professor Robert Beck Clark, of the University of Texas' Center for Particle Theory, as saying that "the great irony of the situation" is that this surplus consists

of "some of the best talent the high school classes of the late '50's and early '60's had to offer." The announcement describes the Texas Project in Science Education, which is a well-received scheme for attracting physics Ph.D.'s into high school teaching and administration with offers of part-time research and university affiliation.

Engineers are meeting the same kind of problems. A survey by the Engineering Manpower Commission, released at the end of April, provided some figures. The aerospace industry, says the Commission, wants to take on this year only 62 per cent of the number of engineers it hired last year; for the electrical and electronic industries, the figure is 82 per cent; in metal products and mining, 85 per cent; machinery and other manufacturing industries, 88 per cent.

The trend would seem to be the other way in government, utilities, construction, and consulting. Planned hires by construction and consulting firms are estimated at 137 per cent of last year's actual hires; state and local governments plan on 27 per cent more engineers than they hired last year; utilities, 19 per cent more, and the federal government 4 per cent more.

Putting the upward and downward swings together, the Commission concludes that overall planned hiring of engineers with 1970 bachelor's degrees will be down only 1 per cent. (The gloomy outlook for doctorate engineering graduates is explored by the Commission's Director in a major article in this issue, pages 32 to 35.)

Another approach to the statistics comes from the M.I.T. Alumni Placement Office, whose purpose is to bring empty jobs and M.I.T. graduates together. In March, April, and May of this year, the new positions listed were, respectively, 335, 450, and 318; last year's corresponding job openings were 618, 786, and 382. Last year in March and April 75 alumni sent resumes as job seekers; this year the mail brought 166 resumes.

Fewer than 850 interviews were arranged by the M.I.T. Placement Bureau for graduate students finishing their academic work in 1966-67; this year over 1,650 interview appointments have been made for the 1969-70 classes. This year's are obviously more concerned over their prospects than their predecessors. But a Westinghouse delegate to the M.I.T. manpower conference said at one



point, "We don't seek Ph.D.'s through the (M.I.T.) Placement Bureau. There's a mystique for finding Ph.D.'s that you have to follow. . ."

Meanwhile, the American Chemical Society reported that, while 343 candidates interviewed 657 employers in the Employment Clearing House at its 1967 meeting in Miami, 385 candidates talked with only 150 employers at its 1970 meeting in Houston.

## ...Needs Useful Work

Are scientists' changing employment prospects simply a result of the Vietnam campaign and a minor national recession? No, said Philip Abelson, Editor of *Science*, at the conference on scientific and technological engineering manpower sponsored at M.I.T. late this spring; even if the Vietnam war were ended, support for science would not resume its former trend. There has been a basic change in public attitude; universities must now concentrate on training science and engineering students to meet the real needs of society, he said.

Louis D. Smullin, Head of M.I.T.'s Department of Electrical Engineering, put it this way: "It is conceivable that we are about at the limit of where it is practicable to make anything fancier in the way of weapons. . . . I don't think it is a matter of the capitalist society being in crisis; I think it is a matter of the industrial society being in crisis. We don't really know what to do with our fancy, sophisticated engineers and scientists, in terms of the ordinary daily needs of people. There are lots of things that need doing. . . . All of them use scientific inputs, but they are not primarily scientific or technical problems."

In different words, this is how Hugh Folk, Professor of Economics at the University of Illinois, said it: "At almost any period during the 1950's and 1960's . . . you could have heard (at a meeting like this one) the threats of disaster if we didn't sharply increase our output of engineers and scientists. . . . These forecasts of shortage impelled us to adopt fellowship programs and summer programs. . . . However the principal impulse to this growth of demand . . . came from federal expenditures for research and development, particularly in defense. We didn't realize how slowly engineering employment was growing—or even contracting, as a proportion of employment—outside a few key industries. In (the conventional) industries something that you might call technological maturation seemed to be occurring. These employers in textiles and a large number of metalworking industries simply substituted less skilled, less trained persons for jobs that were once held by graduate engineers.

"Engineering employment is concentrated in a few industries: electronics, aerospace, instruments, and ordnance. . . . There are simply not enough jobs outside of these industries to provide for a significant number of graduate engineers. . . . These industries are sick, they are not growing. . . . An increasing number of engineers hope they won't grow. The successful aerospace firm is probably going, and it's in terrible shape."

Are engineering students sensing the same problems? The recent experience of the M.I.T. Placement Bureau, says Robert K. Weatherall, its Director, is suggestive. "The great basic industries have seemed boring" to M.I.T. students. The "Route 128 company" has seemed to be "the model of the new employer," and now, he says, with the decreasing demand from such companies, students and faculty alike need a new image of how an engineer can serve himself and his society.

Irwin W. Sizer, Dean of the Graduate School, joins the lament: "It's hard to convince M.I.T. students that going into basic industry is a promising and acceptable career. Too many of them simply see big business as basically evil, paying low wages, polluting the atmosphere, burying workers and professionals in large organizations."

## DDT and the Egg

Old and fragile collections of eggs were for years but museum curiosities and ornithologists' quirks. But when the peregrine falcon and other birds of prey began a decline in the 1950's, a few English scientists suspected that the massive infusion of pesticides into the earth and air might be at fault, and these old eggs gave them damning proof.

Eggs from the turn of the century to the present were measured for shell thickness by several independent groups. Each study found one year when shells became from 8 to 24 per cent thinner. American work supported similar figures for the same year—1947, about the time when DDT came to be widely used. The mechanism remained unclear.

In the light of research in other areas, several mechanisms seemed possible. DDT increases the activity of liver enzymes which break down the sex hormones, it was found, and since estrogen is needed for the transfer of stored calcium to the shell glands, it was suspected that the hormone's accelerated removal might cause inadequate shell calcium. (It has been proposed that DDT's effect on estrogen might counteract the contraceptive pill.) Alternatively, DDT's action on the neuromuscular system—the action by which it kills insects—might eject an egg before it was finished.



A third suggestion was that DDT might make carbonate less available—the shell is almost entirely calcium carbonate—and this has been found to be so. Dr. Joel Bitman, of the United States Department of Agriculture, fed Japanese quail a diet containing 100 p.p.m. of DDT or of its common breakdown product DDE. Carbonic anhydrase, an enzyme that ensures an adequate amount of carbonate ions for shell growth, was decreased in the shell gland by 16 to 19 per cent and in the blood by 22 to 24 per cent. Calcium content of eggs was down correspondingly. Therefore, Dr. Bitman suggests DDT's inhibition of carbonic anhydrase is primarily what prevents the building of an effective shell.

## International Fusion on Peaceful Kilotons

Gay Vienna is increasingly becoming the world center for discussions on nuclear energy. While public interest is focused on the Strategic Arms Limitation Talks at present in progress between the U.S. and U.S.S.R., other delegations at the Vienna headquarters of the International Atomic Energy Agency are quietly preparing forthcoming panel discussions on the peaceful uses of nuclear explosions, following the success of the first of a series of meetings on the subject. Sixty experts and observers from 30 countries and three international organizations spent a week in Vienna at the beginning of March, to share summary statements on national programs concerning peaceful uses of nuclear explosions and to discuss the behavior of these contained and cratering detonations.

Dr. Sigvard Eklund, Director General of the I.A.E.A., explained at the opening meeting that the panel was intended to be "a major step in the fulfillment of I.A.E.A.'s responsibility to foster the exchange and dissemination of information between the scientific experts of our Member States." He recalled that in Article V of the Treaty on the Non-Proliferation of Nuclear Weapons the parties undertake to ensure that "the potential benefits of any peaceful application of nuclear explosions will be made available" to non-nuclear-weapon states.

Mr. Eklund showed great optimism as to the results of this and of future panels, and this spirit in fact prevailed

throughout the conference. Delegates, even where they had doubts on the good will of the nuclear powers to act in full accordance with their obligations, said so only in private talks—they showed no intention of putting these doubts on official record. Both the U.S. speaker, Milo D. Nordyke (Lawrence Radiation Laboratory, University of California) and O. L. Kedrovski, on behalf of the Soviet Union, offered much the same optimistic outlook: the use of nuclear explosions to create storage areas for natural gas or petroleum, mining or radioactive waste, to assist in building canals or harbors, and to help in quarrying by breaking up surface deposits. Both speakers further offered a great variety of scientific applications, such as probing the structure of the earth's crust, the production of new elements and the exploration of the physics of matter beyond the end of the periodic table; and medical applications were also mentioned. Nuclear explosions have turned out to be much cheaper than conventional ones, the price of 10,000 tons of T.N.T. being \$5 million while one can have a "peaceful atom bomb" giving the same effect for no more than \$300,000 to \$400,000.

No official record of the discussions was released, but delegates apparently showed no particular reluctance to provide full information. There were, however, no reports so far on practical ways of assisting non-nuclear powers in using nuclear explosions. It seems that this issue is being held for later consideration.

Further panel discussions have been proposed on general and radiological safety and on the applications of the technology. The next of these meetings is expected to take place by the end of 1970.—*Fred Margulies*

## 10<sup>6</sup> Neutrons/Sec.: \$1

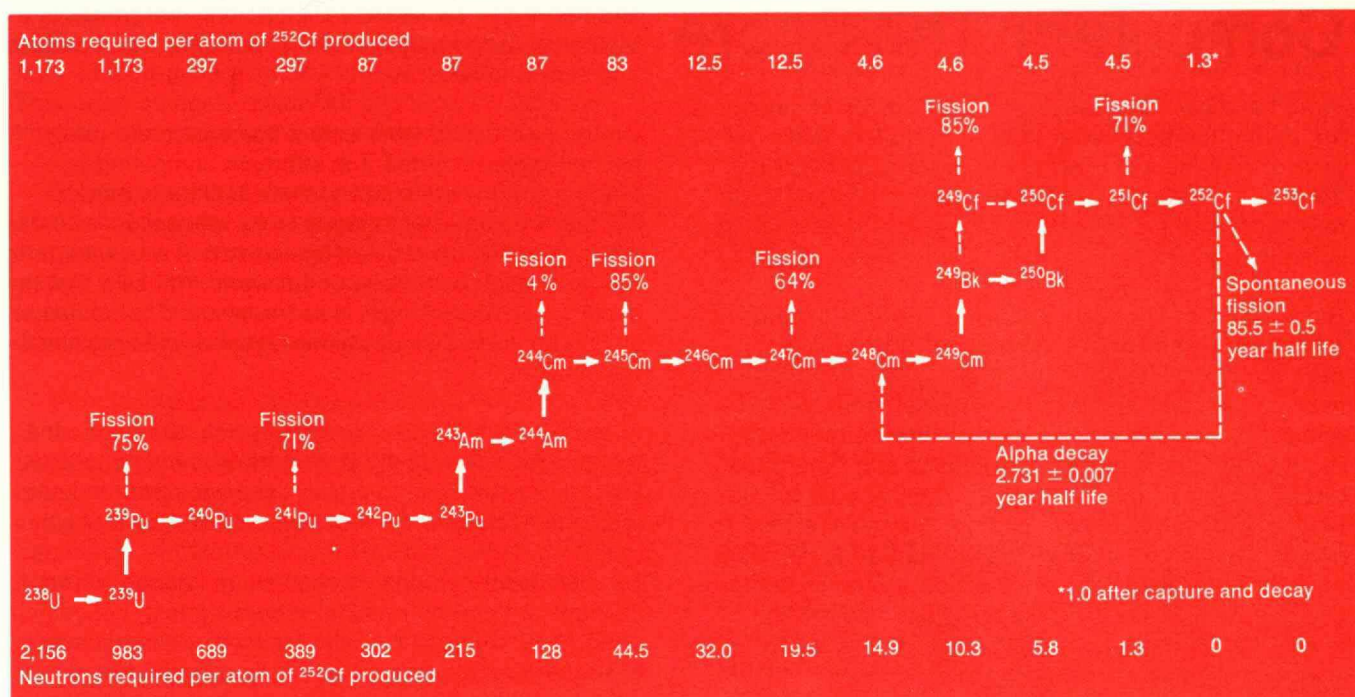
For a compact, portable, and maintenance-free source of neutrons, the Atomic Energy Commission is promoting californium-252, a man-made radioisotope of the unstable element which is number 98 in the periodic table. One gram of californium-252 emits neutrons through spontaneous fission at the prodigious rate of  $2.34 \times 10^{12}$ /sec., with a half-life of 2.65 years, and by 1980 the Atomic Energy Commission expects to produce californium-252 by the hundreds or thousands of grams through processing spent reactor fuels, and to sell it for about \$1/ $\mu$ g.

The californium-252 available today is made by adding 14 neutrons per atom to uranium-238, the heaviest naturally occurring nuclide available for target use. It is a painstaking process of irradiation and re-irradiation. The best results yet attained by A.E.C. require for one atom of californium-252 in a neutron source as many as 1,173 atoms of uranium-238 and 2,156 neutrons. Total production, using in sequence the Savannah River production reactors and the High Flux Isotope Reactor at Oak Ridge, was 33 mg. in 1969, and the 1970 schedule calls for 67 mg.

But later in the 1970's, californium-252 will be produced by adding small numbers of neutrons to ameri-



When it is finally on the market in some quantity, californium-252—which releases prodigious numbers of neutrons through spontaneous fission—will represent a research, testing, and production investment of several million dollars a gram. The addition of 14 neutrons to uranium-238 is accomplished by a complex series of irradiations which together require 1,173 atoms of uranium and 2,156 neutrons to produce a single atom of californium-252. But spent fuel from nuclear power reactors will provide a source of americium-243 and cesium-244, thus considerably reducing the complexity and cost of californium-252 production. Indeed, A.E.C. is now surveying potential uses of californium-252 in order to develop the market for a by-product from the spent fuel which will presently become available.



cium and curium isotopes which will be available as by-products from spent power reactor fuels. Then will come the larger volumes and lower prices (\$10/ $\mu$ g. in the 1970's, lower in the 1980's) predicted by A.E.C., and californium will presumably become an important use for a product in relatively plentiful supply and hard otherwise to dispose of.

To what end? J. L. Crandall of the Savannah River Laboratory operated by E. I. du Pont de Nemours and Co. told the American Chemical Society in Houston in early spring that all kinds of natural resource studies will benefit from the use of californium neutron sources. The present small supplies have been devoted—in part—to a loan program so that potential californium buyers could test its usefulness. As a result, said Mr. Crandall, "the production program has some rational expectation of meshing with a market demand."

Already, he said, tiny californium neutron sources—from 1 to 50  $\mu$ g.—have proved themselves in neutron activation measurements of mineral contents and in oil-well logging to measure the porosity of rocks. Californium-252 led to more accurate results—and the

probe in which it is supplied is smaller than other standard neutron sources. Californium-252 is also useful for mineral analysis, prospecting for gold, silver, uranium, and at least 30 other elements.

But Mr. Crandall expects largest demand for californium-252 to materialize from process control applications—nondestructive analysis based on neutron activation, transmission, and moderation experiments. Neutron-radiography—using neutrons like X-ray energy to expose photographic plates after penetrating materials to be tested—ranks second in projected californium-252 demand. Third are medical applications, where neutron sources are needed in radiation therapy, radiography, and for producing other useful isotopes.

The big advantage of californium-252 is its small size and the intensity of its neutron output. A needle-sized container holds 0.75  $\mu$ g., plenty for some of the mineralogical applications. The problem may be more to keep from losing it in the field.



# Computers: The Score

What have been the successes and failures of computing during the past decade? Are computers really useful anyway? These were two of the basic questions that Sheldon B. Weinberg, of Cybernetics International, put to a panel at the Spring Joint Computer Conference in Atlantic City.

Richard Hill, of Informatics—one of the more successful software companies—counted as fields of success multiprogramming, time sharing, the “marriage between computing and communications,” and the development of compilers (which act as interpreters between programming languages and the machine). The opportunity to discuss failures, though, he compared to “being the first man at the buffet table.” Large systems, in general, are large failures, he said. He attributed this to “the Quixote Complex”: every proposal becomes more and more ambitious, by a series of one-upmanship moves, before it is taken up. Psychologically, failure is attractive—it is more exciting than success.

Panelist Herbert R. J. Grosch of the National Bureau of Standards (who usually performs his iconoclastic functions from the floor) named one success—the I.B.M. Corporation. A possible second success was the demonstration of the fact that U. S. computer men are not a profession. In Israel, he said, for every computer there were six members of a computer-professional society; in the U.K., four; in the U.S., one-third of a member per machine, probably diminishing. Later, Mr. Grosch said that an organization of computer professionals should act as an early-warning system, ensuring that future societal options, which their expertise enabled them to foresee, would be adequately considered in advance.

Robert B. Forest, editor of *Datamation*, pointed to the failure to find ways of measuring the performance of computer systems. Grosch commented that as a result of this inability to evaluate, it is impossible to demonstrate improvements in efficiency. “Naturally,” he added, “most people don’t want their efficiency measured.”

Charles P. Lecht, of Advanced Computer Techniques, counted as a success—in the business computing field—the discovery of how much business is not capable of

being automated: the discovery of the schism between the material and nonmaterial aspects of business activity. During the past decade, he said, there had been a failure within the computer world to understand what constitutes “business,” attributable to placing reliance on the idealistic literature published by the business schools.

Thomas DeMarco, Vice-President of Mandate Systems, added: “MIS (management information systems) is a conceptual failure. The idea has been shown not to be valid.” A machine cannot be expected to do a job—market prediction being one of DeMarco’s examples—that nobody really knew how to do when it was done manually. Mr. Lecht, on this theme, said that two basic principles had been violated: that a MIS can be built, and that it can be delivered. It can only be grown, in a biological fashion, by the careful nurturing of an embryo, and then “infused.”

On the question to what extent computers are really useful, DeMarco noted that although computing is already a \$15 billion industry, there is little in modern life that we can trace directly to its influence—whereas when aviation was a \$1 billion industry it was well on the way to changing the face of the world. Hill said that the question of “usefulness” was irrelevant. The computer should be viewed simply as an agent of change, like the automobile.

In answer to a previous viewpoint from the floor—that the computer was really just another of man’s tools—Forest had observed that man becomes *fond* of his new tool, and has a strong tendency to treat it as a plaything.

He then described one mechanism of change: given, for example, an on-line criminal-record system, policemen on the beat will tend to make far more data-requests to headquarters than they used to. As a result of this, it will be decided that a bigger system is needed. Conversely, the census, as a result of having data-processing facilities, now asks more questions. It was at this juncture that Grosch—who had already said that computers were becoming *less* useful than they used to be, owing to a “dilution factor”—made his remark about the early-warning function of an ideal society of computer professionals.

## Data Processing: State of the States

State governments find new technology at least as hard to live with as the rest of us. A whole series of frustrations, which in summation amount to gross inefficiency in the state’s use of its computers, are described in a report (*Data Processing in the Commonwealth of Massachusetts*) by Alvin Kaltman, Director of Massachusetts’ Bureau of Systems Analysis, Data Processing, and Telecommunications. “Indeed,” writes Mr. Kaltman, “the Commonwealth’s data-processing equipment is for all practical purposes idle for over two-thirds of available processing time.”



Other states are both better and worse. Mr. Kaltman speaks well of Nebraska, for example. Some states have developed what John L. Gentile of the Illinois Budget Bureau calls "pockets of sophistication." Speaking at a session on state data processing which Mr. Kaltman chaired during the Spring Joint Computer Conference, Mr. Gentile cited Wisconsin's system for matching employment-seekers to jobs and his own state's Medicaid payment system which handles 800,000 payments a month; and there are many other local successes.

But there remains a long way to go. Among sources of inefficiency in Massachusetts, Mr. Kaltman's report mentions these:

- ◇ State agencies have failed to change computer programs and systems when their computers have changed from second-generation to third-generation machines. This often compels advanced machines to perform little or no better than the ones they replaced.

- ◇ Software systems are unsupported by documentation. The consequences here are twofold: critical processing steps may be known to only a few employees; and at a high level "the lack of documentation makes it impossible for one agency to review or use another's computerized system," said Mr. Kaltman.

- ◇ Purchasing is unsophisticated and uncoordinated. State agencies, in requesting bids for equipment, usually imply a need for a particular machine of "the manufacturer whose salesmen have managed to convince the requesting agency of the need for their kind of equipment in the first place. Too often the need does not exist."

- ◇ Developing programs and buying new equipment "generally have been planned and pursued as independent entities. . . . Resources are squandered through the acquisition of computing equipment without the necessary systems design."

The same kind of criticism can be made of the state's use of computer-related services: "Two systems that are technically rather simple to design and implement and which should have required the efforts of two qualified programmer/analysts each for six months apiece, have been over a year in the making, at an estimated cost of over \$1 million, and will require an additional \$400,000 to complete; moreover, . . . both systems are in need of revisions so extensive that they may even need to be redone from scratch."

Mr. Kaltman, a systems design and data management specialist who came to Massachusetts about a year ago, says that the state operates 34 computers and in this fiscal year will spend \$15 million on data processing; by fiscal 1973 the figure could be \$40.5 million. (This is not the biggest state data-processing budget; California's is at present \$46 million.)

Much of Massachusetts' inefficiency, says Mr. Kaltman, can be traced as in the examples to the uncoordinated work of inadequately trained personnel. And since

shortage of experienced people is an enduring feature of the computer field, some way must be found to make the wisdom of the few supply the needs of the many. One way, according to Mr. Kaltman, is to establish a centralized state computer service bureau which would help all the state agencies with purchases, systems analysis, and programming. He calculates that such an "Office of Information Systems" for Massachusetts would in its first year cost \$610,000 and save \$3 million.

A year ago Mr. Kaltman was instrumental in forming the National Association of State Information Systems as a member of the Council of State Governments, and now the first *N.A.S.I.S. Newsletter* has come from Mr. Kaltman's State House office in Boston. N.A.S.I.S. has already developed standard drafts for hardware and software bid requests; and on the subject of consultants, in its first *Newsletter* Mr. Kaltman makes this simple suggestion: "Without trying to be a nasty guy or blacklist anyone, as a responsible administrator it would be nice to know if a particular firm's performance on a prior contract for some other state was technically adequate." Perhaps the idea of an independent user association is not entirely a lost cause.

## Heart of the Matter

When you set out to start your own business, be honest with yourself. Be sure you work for the goals you really want.

Do you want an office with a one-inch-deep carpet and a private bar?

Do you want the glamour and fun of press conferences, high-pressure trips across the country, and a fleet of mini-skirted secretaries?

Do you want a pretty little factory two miles from a ski slope and 10 miles from the beach?

Or do you really want success in the market place?

"When we finally decided our goal was to make profit, it changed things," Kenneth H. Olsen, President of Digital Equipment Corp. (whose success story is now one of the near-legends of the computer business), ad-



After several generations of a virus have been produced in a cell, a mutant form, the defective interfering (DI), often occurs. It can clear the cell of normal viruses and stop the infection. If a normal virus escapes, however, the cycle can begin anew, and the patient experiences a chronic, recurring infection.

mitted to an M.I.T. alumni group early this spring. "We turned from designers into manufacturers; we started weighing all the gimmicks and fads and new products we thought would be nice."

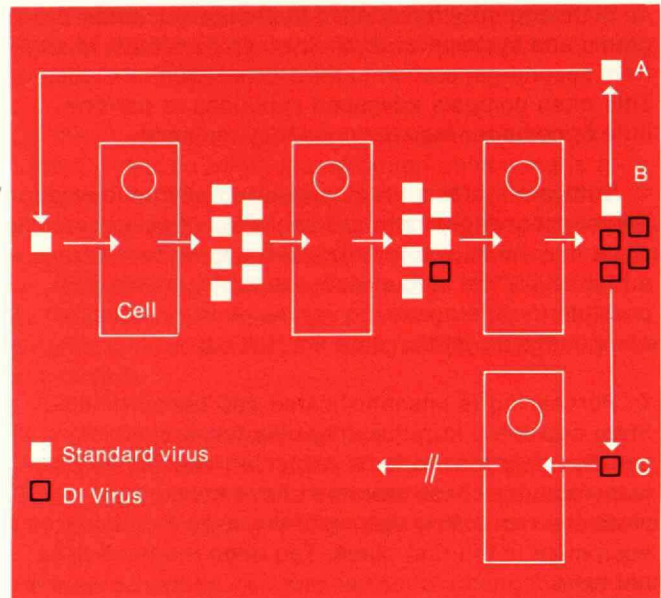
But even when you get down to the nitty-gritty this way, said Mr. Olsen, never lose sight of the fact that your people, too, want "to be creative, to themselves express their goals, values, morals." Perhaps the successful entrepreneur's hardest job is to keep his own goals consistent with those of the employees upon whom he depends.

## Your Kid's Not the Only One

Black sheep and shirt-tail relations may do in the best of families, and there are times when one cannot but secretly applaud the downfall. One occasionally unimpeachable family harboring a laudable deviant is that of the virus, if a model proposed by Alice Huang, Research Associate in Biology, and David Baltimore, Associate Professor of Biology, both at M.I.T., is found to obtain.

In a paper published in *Nature* for April 25 (pp. 325-327), they suggest that after several generations of a virus have been produced, a variant form occurs which is capable of preventing the standard virion from reproducing, cannot replicate by itself, and which reduces the level of infection so as to be overcome by an organism's natural defenses.

Dr. Huang and Dr. Baltimore describe this defective interfering (DI) virus as containing normal viral structural protein and part of the viral genetic material, as being able to reproduce in the presence of standard virus, and as interfering with the intracellular replication of standard virus of its own kind. Yet it seems not to be a "whole" virus. In some species, it lacks the largest RNA species found in the standard version, and contains smaller pieces of unidentified RNA. It seems to form more readily from types which contain several smaller pieces of genetic material rather than one large one. It can arise from purified strains, and may be viewed as a regularly occurring mutant.



In the theory, such a particle occurs occasionally in a few cells after an infecting virus has reproduced several times. The DI virus will replicate itself at the expense of standard virions also present and spread to other cells, continuing to decrease the numbers of standard virions. When there are too few standard particles left to support their growth, the DI particles will decline, allowing the regrowth of the standard form to support another regrowth of DI particles, or allowing the body's natural defenses to rout the standard so that both the standard and DI forms die out.

Researchers have not yet isolated DI particles from naturally occurring infections in animals, although the viruses which cause some infections have yielded DI variants in the laboratory. Yet their activity in natural infections has been documented for a few viral diseases, particularly influenza and Rift Valley fever. Many viral diseases exhibit the pattern of Dr. Huang's and Dr. Baltimore's model, and they feel that DI virions will prove to be influential of the course of lymphocytic choriomeningitis and measles, among others.

The presence of DI particles, however, does not assure that a disease will be harmless. Continuing cycles of repression and regrowth may produce a low-grade, lingering infection. DI virions themselves may interact with their host, and this interaction may be to the host's



detriment: vesicular stomatitis DI particles, for example, inhibit synthesis of RNA by the host.

The host evidently also influences the course of DI virus growth. Temperature, heredity, hormones, and other cell and tissue conditions can prohibit or foster their synthesis.

## Part Two: Foiled Again

The deed is done, the pillage complete, and inexplicably, there is no escape. Your flu virus finds himself at the cell wall, with no way out. The guy who watched the door got tied up, and the door is now locked.

So suspects Dr. Jerome Schulman of the Mount Sinai School of Medicine. He reported to the American Society of Microbiologists in Boston this spring a series of experiments which, first, demonstrated the relationship of two separate antigen systems in the influenza virus and, second, showed how immunity to each system might provide a different way of inhibiting the infection's spread.

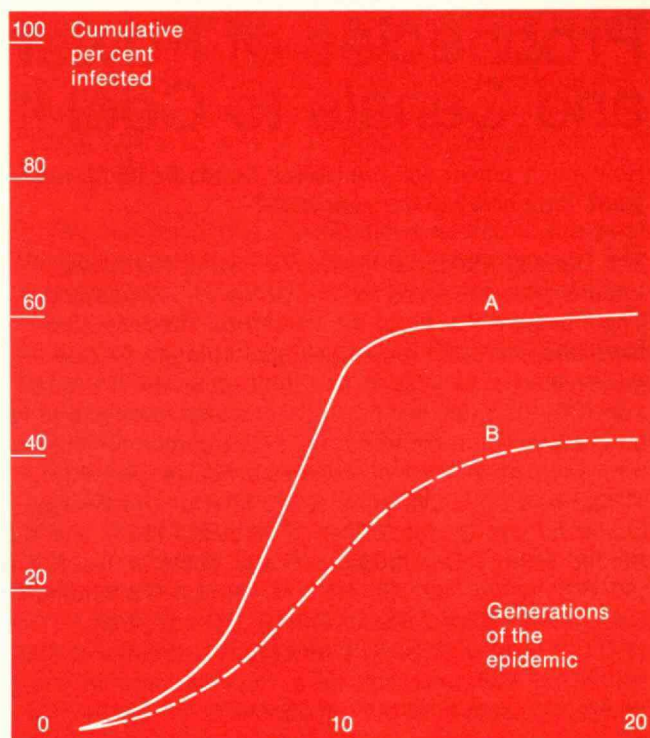
One series of antigens is connected to hemagglutinins in the viral coating; the other is connected to the enzyme neuraminidase, also found in the coating. Hemagglutinins help the virus attach itself to the cell wall, and neuraminidase, Dr. Schulman found, helps new viruses formed within an infected cell to break out. His task has been to explain the role of the neuraminidase antigen system.

Dr. Schulman immunized mice against a strain of the virus having a given hemagglutinin antigen and enzyme antigen. When the mice were subsequently exposed to influenza strains which had either a different hemagglutinin antigen or a different neuraminidase antigen, their antibodies proved effective against the particular variant to which they were immunized: of the pair of antigens, they were susceptible to the one which was new. Immunity to one antigen system, therefore, did not guarantee immunity to the other.

Other experiments showed that immunity had different effects in relation to the two antigen systems. Naturally enough, mice immunized against hemagglutinin antigens developed lower amounts of the virus in their tissue, when exposed to infection, than nonimmunized mice. Likewise, mice immunized to the enzyme antigens also showed fewer viruses—but in addition proved less able to transmit the disease to other animals than did their untreated brethren or those immunized only with hemagglutinin.

Intercellular transmission was also lessened in these mice: although there might be just as many viruses in each infected cell, the number of infected cells was less, and the overall number of viruses might be 99 per cent fewer. This is evidence that perhaps the virus's neuraminidase assists the release of new viruses

*A comparison of the effects on broad immunity between immunization procedures which do or do not affect the capacity to transmit infection. Population A consisted of 600 individuals, of which 300 were immunized. The immune subjects can transmit influenza if they are infected. Population B consisted of 600 individuals, of which 300 were immunized with neuraminidase (see below), so that the immune subjects cannot transmit the disease if they are infected.*



from the cell and that antibodies against it inhibit this function, preventing the escape of the virus from the infected cells.

Dr. Schulman suggests that this idea tallies with the periodic sweeps of influenza across the world. Those massive infections, called pandemics, which affect great numbers of people, are those caused by a virus bearing two new antigens; those of lesser effect, epidemics, probably have only one new antigen. The Hong Kong flu of the past few years, he thinks, has a neuraminidase antigen from an earlier strain, and the sweeps have been less unbridled.

Two separate ways of immunization might thus be open to us, he concludes. Broad immunity to the enzyme antigens would limit transmittal of influenza, and those who are particularly susceptible might be immunized against the hemagglutinin antigens as well. Enzyme antigens seem to change less often, so using only neuraminidase for broad immunity might make the emergence of new hemagglutinins less frequent.

The top chart shows four estimates of the total energy requirements of the U.S. to the end of the century (including energy-equivalents of non-fuel uses of fuel materials). The bottom chart shows four estimates of per capita energy use in the U.S. during the same period. (The abbreviations are deciphered in the paragraphs below. These graphs were abstracted and drawn from tabular material in a Battelle comparative study.)

## Prophecies of Power: and Canals to Cool It

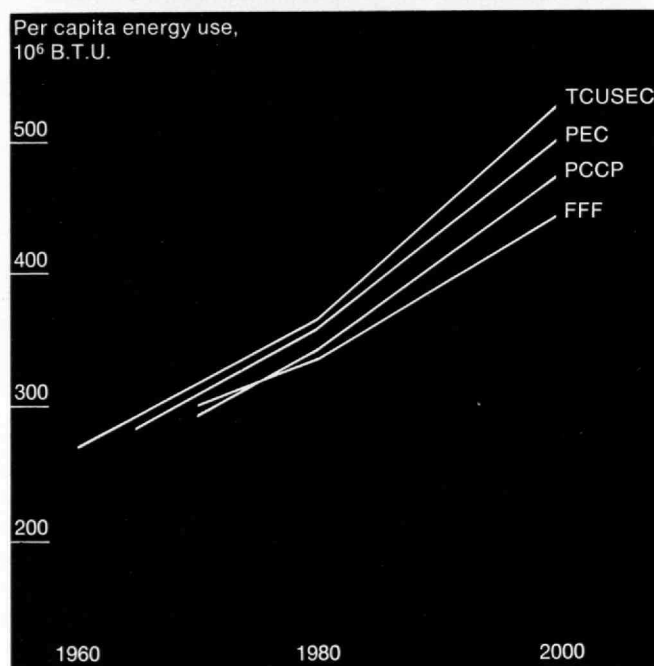
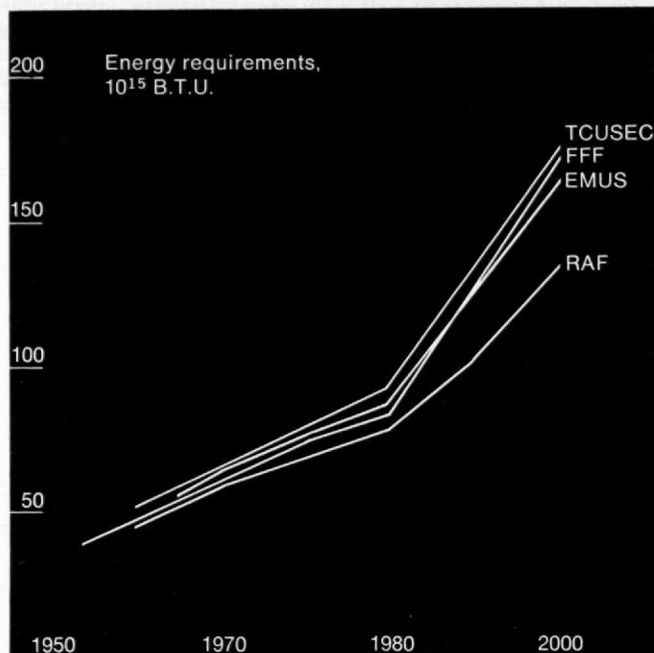
How much power will the United States be using ten years from now? In the year 2000?

The Battelle Memorial Institute's Pacific Northwest Laboratories prepared for the Office of Science and Technology a review of the numerous forecasts that have been made in recent years, attempting to categorize their assumptions and their methods of prediction. The graph shows four of the twelve forecasts of total energy requirements: those of Resources for the Future, Inc. (*Resources in America's Future* [R.A.F.], 1962), the U.S. Department of the Interior (*An Energy Model for the United States* [E.M.U.S.], 1968), the U.S. Atomic Energy Commission (*Fossil Fuels in the Future* [F.F.F.], 1960), and of Alan M. Strout (*Technological Change and United States Energy Consumption* [T.C.U.S.E.C.] a University of Chicago doctoral thesis which the reviewers hail as a "tour-de-force in energy analysis," dated 1966 but unpublished.

Included in all these are energy equivalents of nonfuel uses of fuel materials. For the year 1980, which all twelve sources attempted to predict, the variation of figures is even wider than would appear from the graph: *Competition and Growth in American Energy Markets* (by the Texas Eastern Transmission Corporation, 1968) estimates the total energy requirement in that year as 97,825 trillion B.T.U.; *Energy Resources*, a report on ultimate fossil fuel reserves presented in 1962 to the National Academy of Sciences, arrives at a minimum of 61,000 trillion B.T.U. for the same year.

The review evaluates 19 documents in some detail and extracts comparative pictures of components of the total energy growth pattern. One example—per capita energy use, to the year 2000—is shown in the second graph. (P.C.C.P. indicates *Projections of the Consumption of Commodities Producible on the Public Lands*, prepared by Robert R. Nathan Associates in 1968; P.E.C., *Patterns of Energy Consumption in the United States*, by William A. Vogely of the Bureau of Mines, 1962.) The review is available from the U.S. Government Printing Office.

In considering future power generation capacity, a key



question is that of the disposal of waste heat. In recent months, Robert T. Jaske, who is manager of Battelle Northwest's Water Resources Systems Section, has made a number of public contributions to this topic, largely based on work performed at Battelle under an Atomic Energy Commission contract.

Addressing the American Nuclear Society in San Francisco in December, he showed that the thermal effect of a proposed power plant upon a stream system can be accurately modeled, and that such modeling, where there is an apparent conflict of interests in the use of a given body of water, "provides a basis for rational people to interact in a meaningful way without the need for dilatory exchanges of official views in the public media." The studies on which this conclusion was based threw up an interesting sidelight on the proposal that waste heat might be used in agriculture (see, for example, *Technology Review*, October/November 1969,



p. 75). Heat discharged into a canal which is open to the atmosphere was shown to be lost to the air within a few miles; so "unless the warmed water is conveyed in insulated or buried conduits, the cooling to atmosphere may dissipate most of the added heat before the water reaches the crops in a normal system." Indeed, it seems that existing irrigation canals and old barge canals "offer a previously untapped heat sink capability of significant size while reducing evaporation losses relative to a cooling tower."

With colleagues M. H. Karr and C. J. Touhill, Mr. Jaske developed the latter idea in a paper presented to the national meeting of the American Institute of Chemical Engineers, held in Atlanta, Ga., in February. He proposes that future large-scale water systems—such as the proposed Ohio Canal, linking one of the Great Lakes with the Ohio River—could take on the additional function of cooling nuclear power stations. A single extended system of lakes and canals could provide cooling, pumped power-storage, municipal water supply, recreation, and local transport. Mr. Jaske describes a Pacific Northwest water diversion scheme in which 990 miles of canals and lakes would handle nearly all waste-heat disposal for 30,000 MW of electric power, keeping temperature increases below 5°C. everywhere in the system.

## Of Significance to the Environment

At the 38th Annual Convention of the Edison Electric Institute, held in Boston in June, the session on environmental improvement consisted of presentations on five E.E.I.-supported projects, selected as being "of particular significance to the environment."

◇ J. Wesley Clayton, Jr., of Hazleton Laboratories, Inc., gave a progress report on the exposure of guinea pigs and monkeys to sulfur dioxide, sulfuric acid mist, and fly ash. So far, guinea pigs seemed to survive rather better on 5 p.p.m.  $\text{SO}_2$  than on either less of it, or fresh air. This concentration is about 50 times the ambient level in Newark, N.J. Similarly, no adverse effect was found when monkeys breathed 0.1 mg./cu.m. of fly ash for 18 months. Combinations of the pollutants are still being tried. Dr. Clayton concluded from his and other work that there is "an extremely tenuous thread linking the ills of modern man with the gaseous and particulate emissions of his technology," and ended with a plea for "a reasoned approach—one which considers all of the relevant data."

◇ Loren D. Jensen, of the Department of Geography and Environmental Engineering of Johns Hopkins University, summarized work done there since 1965 on the physics of heat dissipation from surface waters heated by power station discharges, and on the associated biological effects. Physical results so far are the subject of a report, *Surface Heat Exchange at Power Plant Cooling Lakes*, published in November, 1969. On the biological side, Dr. Jensen said that the studies "have not revealed conspicuous biological changes in populations of

aquatic organisms residing in waters influenced by power plant discharges," and that special care will have to be taken to identify "less obvious and (more) subtle biological changes, if and when they occur."

◇ Gulf General Atomic Inc., in the "very beautiful" environment of its San Diego laboratories, has been working on zinc-oxygen batteries for a number of years developing a prototype 20-kW battery of this type for testing in vehicles. The prototype will consist of eight modules, each containing five cells and occupying a volume of half a cubic foot, including the electrolyte pump system and oxygen manifold. Testing was planned for July, on a vehicle built by the British electrical equipment company Joseph Lucas Industries. The advantage over a lead-acid battery vehicle of the same battery weight and power lies in an increase in range by rather over a factor of two. At present, said Dr. Giovanni Caprioglio, the primary objective is the fleet-operated urban delivery vehicle, long a reality in England. "Small improvements to existing technologies can bring it to a reality in this country."

◇ The two remaining contributions related to the aesthetic appearance, rather than the healthiness, of our surroundings. Gerald L. Fox told of General Electric's work on low-temperature (but not superconducting) underground cables. The company's Resistive Cryogenic Cable Project is now in its third year, and it seems that liquid-nitrogen-cooled cable should be economically competitive in the power range 2,000 to 5,000 MVA. It is envisaged that a terminal building transmitting 3,500 MW of electric power could handle the refrigeration of ten miles of cable, with intermediate stations refrigerating further five-mile lengths. Cable with this electrical capacity, plus its liquid nitrogen and insulation, could be contained in an 18-inch-diameter pipe—of which 1,000 ft. will hopefully be tested in 1974.

◇ Whereas the conductivity of copper is increased by a factor of ten by cooling it to liquid nitrogen temperature, certain materials become infinitely conducting if they are close enough to absolute zero—at any rate, for direct currents. Alternating currents introduce "hysteretic" energy losses, due to the movements of induced magnetic fields. Hugh M. Long, of the Linde Division of Union Carbide, said that the power demands of the 1980's make superconducting cable look interesting; and he described a recently completed project "to show experimentally that the hysteretic losses in a power line configuration are of such small magnitude that an a.c. superconducting transmission line should be considered feasible."

*This crucible, sliced through the middle, demonstrates why Illinois Institute of Technology Research Institute scientists propose to think of municipal trash as "urban ore." Incineration of waste at 2,800°F. yields a nodule of ferrous alloy (bottom of crucible), an intrusion of nonferrous alloy (white area in the center), and a volume of glassy slag—in all about 400 pounds of residue per ton of waste, with a value of \$4.90.*



## Gold in That Trash

Don't think of municipal waste; think of "urban ore."

Incinerated to 2,800°F. instead of the 2,000°F. commonly used in municipal incinerators, ordinary city trash can be made to yield well differentiated ceramic and metallic fractions which—according to engineers at the Illinois Institute of Technology Research Institute—may net out at just under \$5 per ton of trash. If the total cost of collecting and incinerating trash is something over \$20 per ton, that represents a retrieval of nearly 25 per cent—not counting the possibility of selling steam generated from the heat of incineration itself.

The I.I.T.R.I. research, directed by Seymour L. Blum, Vice-President, has identified various glass and metal products that can be made from 2,800°-incinerator residues: the ceramic fraction can be processed to

yield glass fiber, glass beads for shot blasting, sewer pipe, structural tile, and other construction materials. Filter pads, abrasive agents, and iron castings can be formed from the metal fraction.

A single incinerator handling 1,000 tons of municipal waste daily, says I.I.T.R.I., might yield 100 to 150 tons of glass, or about 35,000 tons annually—3 to 4 per cent of a market which is growing at a rate of 12 per cent a year. And there are other advantages claimed for high-temperature incineration, as well: combustion is more complete, so there is less smoke; the residues are dense, sterile, and inert materials; odors and dust are more easily handled; the final volume of unusable waste is more dense; and the process—once incineration is underway and with the proper incinerator design—may not require added fuel.

## Smokin' and Drinkin'

For the smoker who has quit, the test seems to be facing a drink without a cigarette. There would now appear to be a good reason for this particularly difficult phase of the good fight: alcohol and nicotine have roughly complementary actions upon the hormone norepinephrine, and for drinkers accustomed to smoking, the combination probably keeps the hormone level normal.

Norepinephrine is produced by the adrenal gland and is chemically and functionally similar to epinephrine (adrenalin). Epinephrine is produced in response to a shortage of sugar in the blood and stimulates both a release of sugar into the blood and, by action on the heart muscle and on the arterioles, an elevated blood pressure. Norepinephrine is produced in response to low blood pressure, and it too acts upon the arterioles for the same effect.

That smoking whets mental alertness and efficiency has been shown, although the mechanism was unclear. Research with rats, reported by Dr. B. Bhagat of the St. Louis School of Medicine to the meeting of the Federation of American Societies for Experimental Biology and Medicine this spring, indicates that nicotine produces higher blood pressure and that, although the level of norepinephrine in the brain remains normal, the rate at which it is produced and used up increases greatly. Further, he suggests, the body adapts itself to this higher supply rate and becomes slightly depressed when it is lessened by the withdrawal of nicotine—a genuine physiological dependence.

That alcohol affects the rate at which norepinephrine is used up has also been shown, and Dr. Bhagat next explored the relationship between the two actions. Alcoholics tend to smoke heavily, he found. He suggests that perhaps, since alcohol accelerates the breakdown of norepinephrine, drinkers smoke to stimulate its production, and to maintain a normal level of the hormone. (He observes that if you never start smoking, you don't have to go through all of this.)

Another paper, presented by two scientists from the Na-

tional Institute of Mental Health, proposed a reason for those familiar nasties on the morning after. They found that methanol, or wood alcohol, which is normally found in trace amounts in the blood, reaches much higher levels when a person has been drinking heavily. Since the same enzymes break down all alcohols, and since enzymes generally prefer longer chain molecules if they have a choice, they surmise that the presence of ethanol inhibits the breakdown of methanol. Methanol thus stays around longer and stronger, and it or its metabolites may well cause that painful sensibility.

## Protein From Starch

British food technologists have developed a fermentation process that converts carbohydrates to a high-grade protein whose food value is said to be comparable to that of milk. Since the process can use any local carbohydrate source—potatoes, sugar, yams—the developers, Rank Hovis McDougall, Ltd., think it could become a low-cost protein producer in all parts of the world.

The process makes use of a fungus, a strain of *Penicillium notatum* whose exact identity is being kept secret pending patent application. However, R.H.M. says that the research team, under Arnold Spicer, picked this organism after considerable study of possible ways to make high-grade protein from universally available material.

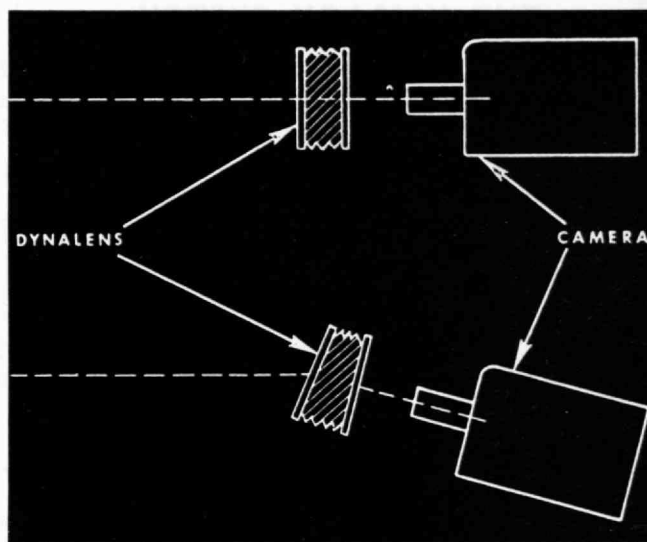
The product, called A3/5, has shown good body-building capacity in preliminary animal feeding tests. Now R.H.M. plans to start large-scale tests with farm animals. There will be no human tests until 1973 at least.

At present a small pilot plant produces 100 lbs. of A3/5 per week in a continuous process. But next year the company hopes to open a larger plant to convert six tons of carbohydrate a week into three tons of the A3/5 white powder. It will use milk whey, molasses, and nitrogen (ammonia) for raw material. When other carbohydrate sources are used, the feed material can be supplemented to ensure that all essential amino acids are available for balanced protein formation.

Although the A3/5 powder could be used as a food supplement, it more likely will be processed into some form that can be eaten directly. R.H.M. talks of solid products that could be made to taste like familiar foods such as beef or chicken. Whatever form the products eventually take, R.H.M. thinks the fungal fermentation process likely to become a big supplier of protein much sooner than other novel protein sources, such as bacteria fed on oil or natural gas.

Britain's National Research Development Corporation also thinks the process has promise. It has been interested in backing new sources of protein; but so far the R.H.M. process is the only one it has picked for substantial support. It has recently granted £500,000 (\$1,200,000) for aid over the next three years in building a full scale A3/5 factory.—Robert C. Cowen

*Steadying the gaze of a vibrating camera: gyroscopes mounted around the camera's own lens control the form of a liquid-and-glass variable prism, or "Dyalens", whose two surfaces move about their (perpendicular) axes rapidly enough to take the judder out of the line-of-sight.*



## Gyros for Everyman

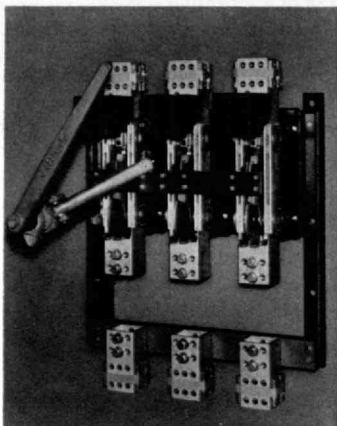
Encouraging examples of spin-off of military or space technology into civilian life are still rather rare. As Professor John E. Ullman puts it, writing in the April issue of I.E.E.E.'s *Spectrum*, artificial heart valves "are made from a material similar to that used for ladies' girdles, but nobody argues that the way to get better heart valves is to do more girdle research."

But an elegant conversion has apparently been scored by the Dynasciences Corporation, of Los Angeles. Founded in 1962, Dynasciences depended on military and aerospace sales for 90 per cent of its takings as recently as a year ago. Six months later, military/aerospace sales were still growing, but accounted for only 70 per cent of the total.

Dyalens is a device for taking steady pictures from a vibrating vehicle, such as a military reconnaissance helicopter. Dynasciences, having established a market vibrating vehicle, such as a military reconnaissance movie makers (it earned an Academy Award, and naturally enough has a role in *Catch-22*), television companies, and the police.

Market studies on the prototype of a less expensive version, designed with "the serious amateur photographer" in mind, are coming shortly.





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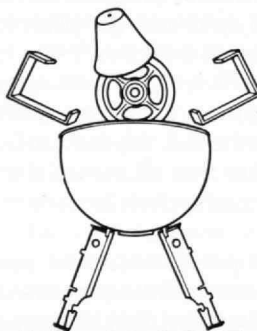
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## The University, Politics, and Mass Transit: Involvement

This is a story of a unique involvement of a major educational institution—as directly as any activist student would wish—in one of the major urban issues facing the nation—transportation.

The stage is Massachusetts—and in particular Greater Boston. The principal players have included Robert C. Wood, Head of M.I.T.'s Political Science Department, Director of the Joint Center for Urban Studies of M.I.T. and Harvard, and Chairman of the Massachusetts Bay Transportation Authority; and Alan A. Altshuler, Professor of Political Science in Dr. Wood's department and a Faculty Associate at the Joint Center.

The scene opened very early this year when Professor Altshuler, who is chairman of a special task force appointed by Massachusetts Governor Francis W. Sargent to study transportation, recommended an immediate halt to some major and controversial highway extensions; he proposed a comprehensive review of all transportation needs, suggested establishing a transportation trust fund, and urged the Governor, along with other state chief executives, to seek a more flexible federal transportation program (one not tied solely to highways). The Governor followed the advice of his task force, and the decision met with general approval throughout the state.

Much more recently a second report from the Altshuler task force attacked the poor labor practices and inefficiency of the Massachusetts Bay Transportation Authority (27 unions) which—with rapid transit lines, street cars, and buses—moves some 600,000 Greater Bostonians daily.

Professor Altshuler's report in fact urged that the M.B.T.A. be granted the additional \$300 million bonding authorization which had been sought for transit line extensions—conditional upon the M.B.T.A. submitting to the Governor within 12 months a concrete program, to which labor has agreed, for substantially improving productivity. The report also asked for a restructuring of the way in which the M.B.T.A. is subsidized; improved efficiency, including a joint five- to ten-year labor-management plan; relocation of M.B.T.A. responsibilities, including local responsibility for feeder services; and increases in long-distance fares integrated with downtown parking charges. (A report staffed by another M.I.T. professor, David G. Wilson of the Department of Mechanical Engineering, with an ingenious incentive efficiency plan, was not mentioned in the Altshuler report.)

Professor Wood reacted with the calm self-imposed by most chairmen to the release of such a strongly worded report—except for the labor-productivity conditions, which drew from him the response that “powerful constraints in labor-management relations, in revenue sources, and in decision making



operate in mass transportation, are not subject to the control of management, and will not be whistled away by magical incantations."

Nor did Professor Wood consider that political trade-offs were wise or even necessary, as the M.B.T.A. is itself the child of the political system.

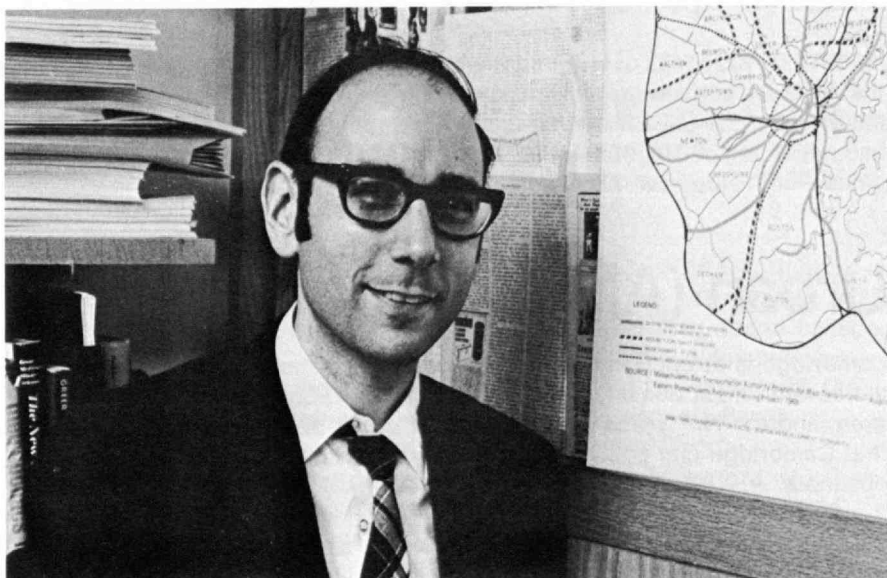
There is little question that both Dr. Wood and his M.B.T.A. operating manager, Leo J. Cusick, have brought about considerable improvements within the M.B.T.A. in the areas of labor-management relations and productivity, though both admit there is much yet to be done. (Both are now leaving the M.B.T.A. for reasons apparently unconnected with the Altshuler report, Mr. Wood to become President of the University of Massachusetts in October, Mr. Cusick for personal reasons.) Professor Wood was upset that the conditions placed by the Altshuler report on the \$300 million bond authorization (which he termed unrealistic) would jeopardize the M.B.T.A.'s chance to obtain its bond issue and so to receive a further \$600 million from the federal government under the two-to-one matching formula of the federal transit bill. The final decision on the bond request still lies with the Massachusetts Legislature.

### Basic Principles if Not Specifics

But in the long run a great deal may result from the willingness of M.I.T. faculty to become involved in such a vital question as mass transit. Already the issues have been clarified and summarized for the public:

- ◇ Public transportation will have to be subsidized.
- ◇ Public transportation cannot be subsidized by the property tax alone, no matter how many communities in a metropolitan area are tapped.
- ◇ Little faith can be placed in any resurgence of commuter railroads as a means of moving people in and out of the city, even with federal involvement.
- ◇ States should set up general transit trust funds so that moneys can be spent on systems most needing aids at a given time.
- ◇ The federal government must eventually develop a general transit fund to support all kinds of transportation on the basis of each method's applicability to a special situation; and when this is achieved, those states which have aligned themselves in a similar fashion will be most eligible for funds.
- ◇ Rapid transit, expressways, feeder roads, and parking lot planning should all be done concurrently and under one umbrella.
- ◇ Travellers will have to pay more for rapid transit, especially suburbanites being hooked in to new extension lines.

A new pattern for handling big-city mass transportation is needed. A start has been made here, and this should remain a continuing study at institutions such as M.I.T.—*Ian Menzies*



*The involvement of the Massachusetts Institute of Technology with the Massachusetts Bay Transportation Authority and with Governor Francis W. Sargent, who once studied architecture at M.I.T. with the Class of 1939, is a case study in the consequences of an institution departing its ivory tower. A good deal of light—if somewhat inconsistent—has been shed on Massachusetts' mass transportation problems, much of it by Alan A. Altshuler, Professor of Political Science (left). But Ian Menzies, a former editor of the Boston Globe who is now affiliated with the Joint Center for Urban Studies of Harvard and M.I.T., comments that "the real value of the reports and dialogue can be assured only by further political decisions of the Governor." (Photo: Donald L. Estes)*

During a recent major policy address delivered at M.I.T. on the Safeguard A.B.M., and M.I.R.V., weapons—the deployment of which are urged by the Nixon administration (see right)—Senator Edward M. Kennedy offered some details of what this “protection” would cost the nation domestically through the decade of the 1970's:

“First, there is the risk of spiraling arms costs which make it extremely difficult for us to meet our pressing domestic needs,” he said. The \$9 billion annual budget which now pays for some of the national strategic forces “is more than twice what the Nixon administration intends to spend on education. It is over seven times more than the Nixon administration intends to spend next year on crime reduction. But, if we do not limit arms control expenditures in the near future, it is estimated that outlays for strategic systems could double by the mid-1970's. That means \$18 billion a year in federal tax revenues would become unavailable to meet domestic needs.”

The second risk he outlined was “an increase in tensions between the United States and the Soviet Union,” reducing even further the chances of peace in the Middle East and Indochina.

The third—most deadly—risk is that our deployment of M.I.R.V. might lead the Russians to establish an automatic response system called a “Launch on Warning,” by which counterattack could be started automatically upon receipt of warning of a possible attack.

“To reestablish a situation where the world is in jeopardy of a programmed response to a blip on a radar scope is the height of irresponsibility,” Senator Kennedy said. “It will have brought us to the final absurdity in which an automatic response by the machines created by man shall determine the end of man.”

“Can any society view the visions and thoughts of youth as radical or extreme when the visions and thoughts of men in power include the real possibility of final destruction?”

## And in This Corner . . .

Although many political issues swept across the Cambridge community this spring with greater force—Cambodia, environmental pollution, the future of on-campus defense research—another persistent issue, further deployment of the Antiballistic Missile System (A.B.M.) and Multiple Independently Targeted Reentry Vehicles (M.I.R.V.), was raised too—this time by a powerful spokesman, Senator Edward M. Kennedy.

In a policy address at M.I.T. on May 15, the Senator charged that “the administration is directly undermining the Strategic Arms Limitation Talks (S.A.L.T.) by pressing for the immediate deployment of the Safeguard A.B.M. and M.I.R.V., the very weapons which the talks are meant to bar.”

His policy speech anticipated the upcoming debate in the Senate on Nixon administration proposals to expand A.B.M. But his major point was that these weapons are not protection but in reality are a threat to national security:

◇ The argument that we need these weapons to offset new “arms build-ups by the Soviet Union” is weak, since there is evidence that these are “tapering off.”

◇ The argument that the A.B.M. is needed to protect our second strike capability, our Minuteman missiles, is specious, since they are protected, “even without Safeguard, by our Polaris submarines.” Although the Polaris is only 15 per cent of our total nuclear force, the system can destroy “the 50 largest cities in the Soviet Union, TWICE.”

◇ Technically, Safeguard A.B.M. may not even work. First, it is possible with existing technology for the Russians to “black out” its crucial radar system, Kennedy said: “Safeguard’s most crucial link is its weakest link.” Second, the administration has admitted the system needs further testing and proving. Why then, Kennedy asked, is it requesting funds for an additional six sites when the first two sites have not even been built—let alone tested?

◇ Kennedy criticized the administration’s claim that Safeguard A.B.M. is a “light” system which will cost \$11 billion. “In fact, it is an open-ended system both in terms of cost and of impact on the arms race. . . . In the end, we will have achieved a new level of arms stockpiling without the slightest increase to our own security.”

◇ Even if a working A.B.M. halted incoming enemy missiles, Kennedy said, the “radioactivity released will kill a large portion of our population within a generation.”

Kennedy won applause for calling A.B.M. “dangerous and unnecessary” and for mocking the Nixon administration’s “trotting out” the “Chinese threat” argument for A.B.M. whenever “the administration becomes desperate enough.

“If S.A.L.T. proceeds over a long period, as it may do, and if both sides argue the need for continuing their build-up to improve their bargaining advantage, the effect of the S.A.L.T. negotiations will be to leave us worse off than if they had never begun. Negotiating about weapons is not entirely like a poker game—both sides can lose. I am afraid we are both going to lose.”

## Urban (Agency) Sprawl

Cambridge is at once the center of elite higher education in Massachusetts, the seventh most densely populated city in the U.S., a principal industrial area, and the “in” place for college-age “street people.” Little wonder, then, that Cambridge city politics and urban problems remain tumultuous and obstinate.

Two recent manifestations are the City Council’s sudden firing of City Manager James Sullivan after one year of his five-year term—a move which

brought loud public protest by many citizens and a statement of "concern" by the Presidents of Harvard and M.I.T.; and the interruption of Harvard University's solemn, medieval commencement ceremonies by a group of Cambridge residents frustrated by the city's long, acute housing crisis.

But Cambridge's problems seem not to stem directly from town-gown, rich-poor, young-old confrontation. A new study by the Institute of Public Administration in New York, financed by the City of Cambridge and the Ford Foundation, points out that the city has 41 separate authorities and departments. The result, say authors David D. McNally and Howard N. Mantel, is lack of cohesion, unclear lines of responsibility, divided jurisdictions, and weak staffing—all of which obstruct "effective control" of agency performance by the City Manager. The I.P.A. report urges the city to strengthen the office of City Manager and consolidate Cambridge's sprawling agencies into a more efficient and responsive mechanism.

The 41 agencies, they say, should be pared down to eight. For example, there are 11 groups in the field of housing; only half of them report to the City Manager. I.P.A. recommends a single agency to take over the functions of the present Cambridge Housing Authority, the Cambridge Redevelopment Authority, the Ad Hoc Housing Development Task Group, the Community Development Service's Housing Division, the Building Department, and the Housing Division of the Department of Health and Hospitals.

Financial planning should be professionalized by combining the present, strong Community Development Service with the smaller, weaker Budget and Personnel Department into a single Planning, Budgeting and Evaluation Office.

The report explains that the kind of organization which Cambridge—and many other cities—now displays was the product of another era, when semi-independent agencies were created to offset often ingrown political management and monolithic machinery of city hall. But now the profession of urban management is more developed; consolidation is in order. The report says that key agency executives should no longer have separate methods of selection to office; they should serve "at the pleasure of the City Manager."

Though the many different people living in Cambridge see the same local problems, they assign different priorities to each. Yet the real issues derive not from the city's unwillingness to govern, but rather from organizational "impediments to perceptive and effective government, . . . deficiencies of omission and neglect," says the report.

## Pennsylvania vs. Disrupters

A new Pennsylvania law requires all colleges in the U.S. to report students receiving aid from Pennsylvania who have been found guilty, in a court of law or by internal discipline, of contributing to the disruption of an institution of higher learning or of "a misdemeanor involving moral turpitude or a felony." Once so reported, a student automatically loses any scholarship or loan funds he is receiving from Pennsylvania.

On the surface, this law is an assertion of the taxpayer's historic right to keep the reins on how his money is being spent—in this case the \$51 million Pennsylvania provides annually to residents, wherever they attend college. The mood of the law, however, is to assert that the state should not subsidize the education of those who have been proved guilty of interfering with the operation of an educational institution or guilty of a criminal offense.

However, ten colleges (Bryn Mawr, Carleton, Harvard, Haverford, M.I.T., Princeton, Radcliffe, Stanford, Swarthmore, and Yale) to date have told Pennsylvania they will not comply. They believe that this law is a serious threat to the historic right of the university to determine how to educate its

## Sources of Our Discontent

What about Cambridge as a university town?

The Institute of Public Administration's report on "Effective Government for Cambridge" (see left) sheds little new light on the alternately stormy and benevolent relations between town and gown. But authors David D. McNally and Howard N. Mantel, after a fairly superficial survey of their various areas of interaction, center their attention on university contributions to financing, housing, and professional support for the city.

Together, Harvard and M.I.T. offer nearly 20 per cent of available jobs in Cambridge. University-associated personnel own or rent one-eighth of the housing stock. The universities own more than 6 per cent of the city's land area. Of \$150 million in Cambridge building construction between 1963 and 1968, only half was taxable by the city.

The most discussed are financial. Both Harvard and M.I.T. pay taxes on properties which they own but do not use for tax-exempt (educational) purposes. In addition, they make voluntary, negotiated tax payments in lieu of taxes for municipal services on campus property—and to soften the blow to the city when they make purchases which suddenly take property off the tax rolls. In 1969 these in-lieu-of-tax payments amounted to nearly \$320,000—\$70,000 from Harvard and \$247,000 from M.I.T. In all, Cambridge received \$1,097,000 from the two universities in 1969, according to the I.P.A. report, compared with total city tax revenues of about \$30 million.

Authors McNally and Mantel conclude, nevertheless, that finances are a major source of town-gown friction. "At a minimum, direct, non-earmarked contributions to the city treasury should be doubled," they say. And they suggest that universities and city together seek a formula on which in-lieu-of-tax payments may in the future be based.

In addition to money, say the I.P.A. authors, "Harvard and M.I.T. can assist Cambridge in many ways: technical assistance in solving problems of parking, recreation, and education; training and employment of disadvantaged citizens; striving for excellence in architectural design; refusing to deal with contractors who discriminate; conducting special courses . . . for community residents, and the like." There are also references in the report to professional planning and consulting help from university personnel, social service work by faculty and students, and assistance from the universities "to ameliorate the critical housing shortages which they helped create."

But, "most of these activities require both money and manpower, a fact that raises issues concerning the allocation of each university's scarce financial resources and methods for mobilizing the necessary faculty and student energies."



students—hence how to govern itself. Like riders on recent federal appropriation bills which deny funding to students found similarly guilty (see *Technology Review for March, 1970, pp. 88-89*), Pennsylvania's action takes away the university's control over how much punishment should be meted out to whom. Those ten colleges to date who have told Pennsylvania they will not comply have also agreed to let Haverford take the lead in testing or seeking appeal of the law.

Schools which elect to resist the Pennsylvania law incur direct and indirect costs. Pennsylvania will not make grants to students attending universities who refuse to comply. In M.I.T.'s case this means that its 350 Pennsylvania graduates and undergraduates will lose the \$110,000 in scholarships and loans which they now bring to M.I.T.'s financial aid funds. This is no less than 1 per cent of M.I.T.'s total aid funds, so that every student applying for aid next year—unless the funds are made up—will receive 1 per cent less.

M.I.T.'s resistance to the law also hurts the 350 Pennsylvanians who previously benefited from their state's generous aid programs; without their Pennsylvania support, they must compete with all other M.I.T. students for that diminished sum of available M.I.T. aid—or find other outside aid. Knowing this, nonetheless, some 100-odd Pennsylvanian students in a meeting with M.I.T. President Howard W. Johnson before the M.I.T. decision was made, voted overwhelmingly in favor of M.I.T. noncompliance.

Irwin W. Sizer, Dean of the Graduate School at M.I.T., who is chairman of a policy committee reviewing this matter, predicts that "the situation will get worse before it gets better." Other states, notably Minnesota, are likely to pass similar laws, and, increasingly, federal appropriation bills will carry stiff riders cracking down on protesters by denying them financial support.

Meanwhile, 1,600 other colleges have agreed to comply with the Pennsylvania measure—leaving M.I.T. in a very small, but distinguished company.

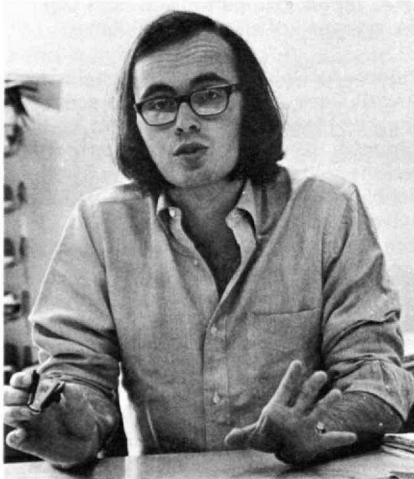
## Forceful, Dissenting Voices

To one young M.I.T. staff member, Interior Secretary Walter Hickel's post-Cambodia "leaked" letter to President Nixon ("... If we read history, it clearly shows that youth in its protest must be heard ...") came as less than a complete surprise. He is David E. Burmaster, 23-year-old Assistant Director for Student Activities of M.I.T.'s Project MAC, a charter participant in the Interior Department's Student Councils on Pollution and Environment (S.C.O.P.E.)—and he terms a several-hour S.C.O.P.E. conference with Secretary Hickel as long ago as last February "one of the most forceful conversations I've ever been in."

Mr. Burmaster is youth director for Project MAC, a major Institute project on the design and use of large, multiple-access computers. He works with the M.I.T. Moratorium Committee, an M.I.T. student "activist" group, and he's no fan of President Nixon or politics in general.

What are the differences in viewpoint between a group of 15 representatives whom S.C.O.P.E. elected to meet with the Secretary—and who resolved while before the meeting not to take the teeth out of their arguments—and an Alaskan industrialist-turned-public-servant? Here are a few points, according to Mr. Burmaster:

- ◇ **Priorities.** The Secretary opened the conference with the statement that first needed is national land-use policy. The young people countered that their first priority was for government to curb the "corporate economy's destruction and pollution of the environment."
- ◇ **Population.** The Secretary, a Roman Catholic, said that programs of education would provide an adequate basis to control population. The students



Even last February, Walter J. Hickel, Secretary of the Interior, was accused of "an act of political courage" by David E. Burmaster, a young M.I.T. staff member (above). Mr. Burmaster thinks the Secretary understood. (Photo: Donald L. Estes)

countered by urging a national birth control policy and repeal of all laws prohibiting abortions.

◇ Pollution reduction. The Secretary hoped to model Interior's water pollution controls on H.E.W.'s policy with the big air polluters: to urge big industry to impose its own restraints, with the threat of tougher federal laws looming in the background. But the students told Mr. Hickel they thought Interior should start prosecuting industrial polluters immediately under existing laws.

◇ S.C.O.P.E. The Secretary "wanted to wire us into the departmental bureaucracy," said Mr. Burmaster. "But we wanted franking privileges, stationery, and a budget—plus a certain amount of independence—to carry out our own campaign."

Other evidence of the Secretary's interest in youth? There is some: a Hickel aide told the *New York Times* that his February conversation with S.C.O.P.E. was instrumental in forming Mr. Hickel's impressions of the integrity and sincerity of many young dissenters, which in turn led him to write the now-famous letter to President Nixon. Mr. Hickel also has proposed the Environmental Control Organization (E.C.O.), a sort of V.I.S.T.A. where college-age volunteers can work on improving the environment. Interior Department spokesmen were sent across country to participate in Earth Day activities on April 22. And Secretary Hickel has established a permanent Youth Division in the Interior Department, headed by 26-year-old Michael Leavitt, who reports directly to the Secretary himself.

Any conclusion? Not yet, says Mr. Burmaster. "All I can say is that at the end of the meeting in February I told the Secretary that it had been an act of political courage for us to meet with him, since many of our colleagues on the campus mistrust the Nixon administration very deeply. And he looked right at me, right in the eye. . . . He seemed almost sympathetic!"

## The University Militant

As the church was the center of change in the Reformation, so is the university now. And the forces leading to change today are as deep and strong as those which shaped the Renaissance and Reformation.

This was his theme when J. Herbert Hollomon, President of the University of Oklahoma, spoke at Harvard University's Senior Class Day Exercises on June 10.

The issues of war, of racial intolerance, and of the misuse of technology "are all symbolic of much more basic value questions," Dr. Hollomon said. In legal terms, the argument is between property and human rights; in economic terms, the arguments are against materialism. In religious terms the issues describe "the search for the common ground of human nature."

The university—though it shares society's faults and must respond to its new questions, he said—is now a social essential. "If we lose the integrity of the institution, there will be no place in the society where the struggle for man's humanity may take place. . . . It is just as inhumane, in my view, to kill a humane institution . . . as it is to kill a human being."

These were his questions for Harvard's seniors: "Do you have enough patience not to become violent? Since the changes perforce threaten others, will the society tolerate them without repression? Can we preserve that which is valuable in our technological society while making it humane, or shall we destroy ourselves?"

"Is the university strong enough to adapt to the conflict and the changes and so to survive?"

## The Class of 1970: Understanding "The Essence of the Middle"

In a technologically conditioned world which is "in the grip of a strong disintegrative process," M.I.T.'s Class of 1970 has a special responsibility: "To set an example in understanding, in compassion, and in leadership."

Howard W. Johnson, President of M.I.T., told a convocation of the Class and its parents June 11, on the eve of M.I.T.'s Graduation Exercises, that the nation's "basic question for the 1970's has become: Can so many different people find a way to live together? . . . The period we are now in is seen by many as being as traumatic as the depths of Depression or the Civil War. . . . (There are) too many separations, along too many axes of our society. Groups of our citizens are being driven apart—not just the young from the old.

"Unless we begin to take steps to understand these splits, and unless we seek to provide some leadership, to face up to the fears and help reconcile the differences, the more obvious problems—of cities and transportation, environment and education—will simply never get solved. For these are 'people problems' just as thoroughly as they are technical problems."

President Johnson listed eight "gaps" by which people are now separated:

◇ The generation gap, "far larger than ever before in history, is a good deal more serious than most of us would have believed," Mr. Johnson said. And he expressed his conviction that "the gap which separates responsible young people from some of their equally responsible elders involves an honest, legitimate difference over social values and personal priorities. We have no reason to fear one another," he said, "nor to treat our differences as cause for despair."

◇ The racial accommodation gap which separates whites from blacks has its counterpart in many groups throughout the world. "Through legislation we have made equality a national goal, but only individual effort can make it a local reality."

◇ The class gap was once defined by Karl Marx, but now it has a different meaning: "The gap between those with opportunity and those without it, or . . . between those who go to college and those who do not."

◇ The intellectual gaps, "the growing conflict of views on what an educational institution is supposed to be, . . . forebodes a whole new sense of the university," Mr. Johnson said. "There are those who want it politicized and active," and if this tide continues "it will destroy the liberal universities as we know them."

◇ The organization gap arises out of "the growing public nature of private



## Resurrecting John Henry

Does society need fundamental change? Or should it merely steer a more moderate course? Are the extremists on campuses today the tip of an iceberg or an isolated fringe?

Two commencement speakers in Cambridge this spring had contrasting views of these issues. And although the contestants were famous and their points of view widely publicized, the debate reflects a dialogue which is now common among scientists and scholars here who are concerned about the rise of extremism both on campuses and in political life.

The debaters were Richard Goodwin, formerly an adviser to President John F. Kennedy and active in the 1968 campaign of Robert F. Kennedy, and Harvard's President Nathan M. Pusey, who achieved national fame in the 1950's for his defense of the university against the attacks of Sen. Joseph McCarthy.

President Pusey devoted a major portion of his Harvard baccalaureate address comparing the "extremists" on today's campuses to the followers of Senator McCarthy who used the "big lie" technique to gain a following and increased power. "Always they insinuate, distort, accuse; their aim being not to identify and correct real abuses but always rather by crying alarm intentionally to arouse and inflame passions in order to build support for 'non-negotiable demands'."

While he said that the origin of the protests at Harvard lay "deep in the texture of things," President Pusey also blamed those in university communities "who, like the honest burghers of the Weimar Republic, peace-loving, tolerant, with no desire to impose their views on others, have been unwilling to pass critical judgment on any of their kind." His message: more people should oppose the "extremists" and come to the defense of the university.

On the other hand, Mr. Goodwin talked less about the universities and more about the troubles of society as a whole. The evils he saw were not campus protesters but the very structure of the society. "In 1959 . . . I believed that if only enlightened men like us could get our hands on the controls, the rising level of human cruelty and affliction could be drastically reduced. I no longer believe that. I have, therefore, become a radical, and I believe in the need for basic changes in the structure and ideology of American society."

Goodwin called for men to change society in order to regain control over technology, bureaucracy, business, and government and so to regain lost freedom. This led him into some side remarks criticizing President Pusey's speech as an example of the kind of labeling and "unreason" which was currently jeopardizing society. "He does not tell us . . . what groups he includes or what ideologies are extreme." And Mr. Goodwin defended the issues raised by those at Harvard in recent years: "These . . . are issues . . . on



*Talking about the ills of society and the greater discomforts of the universities was a common denominator of U.S. commencements in 1970. At Harvard, Nathan M. Pusey (left, with Francis W. Sargent, Governor of Massachusetts) promised that "there is a world of reason, modesty, charity, and trust in the midst of, and opposed to, the oppressive and contentious world of deceit, anger, vilification, and self-righteousness . . ." But at M.I.T., Richard N. Goodwin (below, right, with Jerrold R. Zacharias and Jerome B. Wiesner) found this judgment inadequate; "I believe in the need for basic changes in the structure and ideology of American society," he told M.I.T.'s Class of 1970. (Photo left: Christopher S. Johnson, Harvard Alumni Bulletin)*

which men of conviction can differ without being called names."

In fact, the two men's basic assumptions were similar, and resembled those of many people in Cambridge today. Both denounced violence. Both expressed dissatisfaction with the general quality of life in America today. President Pusey said, "There is a . . . widely shared feeling of revulsion against the values and modes of living in the enlightened society. . . . The taste for this long-wished-for life has gone flat." And Mr. Goodwin said, "It is not the young alone who are alienated, or the blacks. It is all of us." Both, in addition, argued that the universities were threatened by this dissatisfaction.

Most importantly, both urged a course of reason, tolerance, and commitment. President Pusey called for allegiance to a "realistic sense of human limitation, to analysis and assessment, to seek to understand and explain, to determine to be adult and fair, and thus to work patiently." Mr. Goodwin urged the "assertion of the human spirit against the enveloping complexities of the modern age," and "leadership which responds to needs and awakens hopes."

So, the main differences in this debate were, in the long run, differences of degree, not kind. President Pusey made less of the ills of society and focused on the university. On the other hand, Mr. Goodwin saw the situation as more deteriorated; the problem is not only the university, but society. Thus, Mr. Pusey recommended that graduates model "the kind of behavior Harvard has always tried to teach," but Mr. Goodwin proposed a general, national society named for the legendary railroad man, John Henry, who, in the old ballad, refused to be defeated in a race with the "steam machine." He quoted:

*"John Henry said to his captain/ A man ain't nothin' but a man;/ And before I'll let that steam drill beat me down/ I'll die with this hammer in my hand!"*



enterprise. . . . There are many people today who are losing faith in the time-table presupposed by economic incentives. . . . They call for a visible and effective display of public responsibility on the part of every company's management."

◇ The technological gap derives from the question of "what should be the proper use of science in serving man's purposes. We are moving swiftly away from a blind faith in the benefits of science toward a strong and growing fear of its side effects, (and) . . . unless we get this righted soon," Mr. Johnson declared, "we are in danger of crippling one of the mainsprings of our national strength."

◇ The military/civilian gap requires simply "a new definition of the relationship between the civilian leadership and the military professionals."

◇ The sex gap, which is the focus of women's liberation, portends "profound changes in the role of women in our whole society which none of us can yet predict with great certainty. They will not come easily," Mr. Johnson warned.

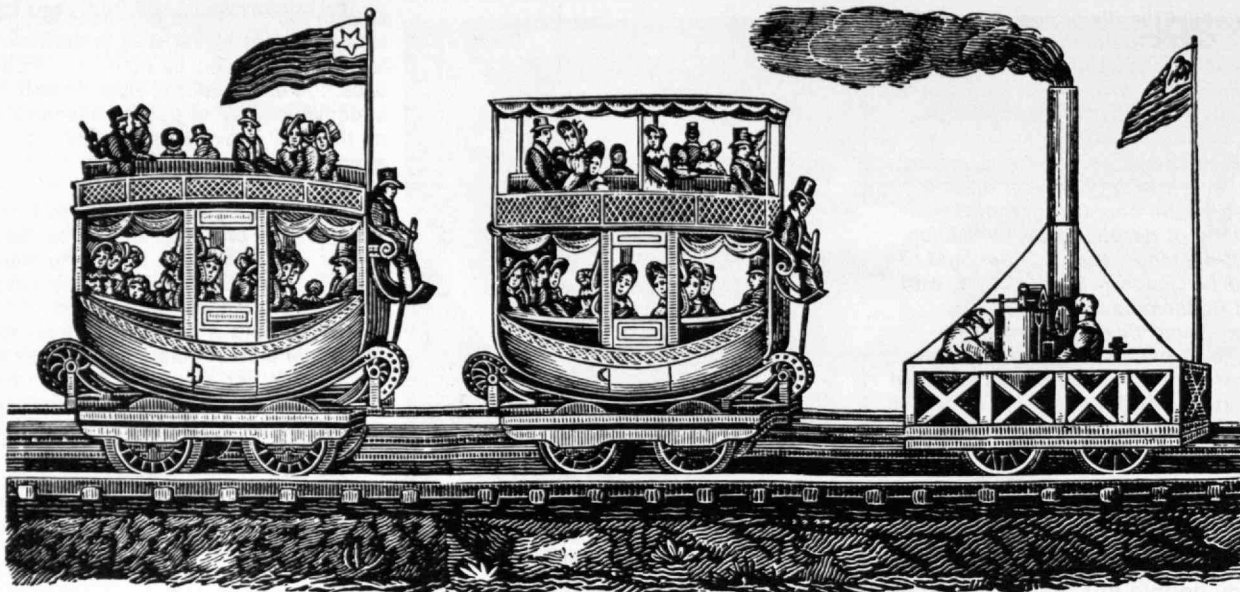
Mr. Johnson offered the Class of 1970 no easy answer: "I cannot give any solution to these gaps other than my belief that we must work doubly hard to understand them.

"Our main effort is not just to isolate or repel the extremes, serious though they are. Our main task is to keep the middle ground together.

"The reason the silent majority is silent is because it isn't yet sure. It needs leadership to encourage openness and to lend direction.

"We must resist the tendency . . . to split and frighten. All of the pressures are moving now toward one end of the balance or the other. Can we understand the essence of the middle? Can we define a common purpose? That is the task," President Johnson told the Class of 1970, "that you together must solve. . . . The easy victories in the headlines will soon fade. What is needed is a longer-lasting, human accommodation.

"We need men of good faith to give direction, values, and spirit to each of the areas where there are gaps—educational, racial, business, community, military, technological, political, even familial. Only a widespread, concerted acceptance of the responsibility of each person to bridge those gaps—first within himself and then within his group—is going to lighten the burden for all of us. There is literally no time to lose."



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# science news

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Several different solutions were received. The one chosen (above) was a joint effort of Bernice Joy Blumenreich and Michael S. Bodner. Others came from Winslow H. Hartford, Captain John Woolston, R. Robinson Rowe, David Blank, Susan Bock, and the proposer, Robert S. Cox.

**26** Show that there are infinitely many integral solutions to  
 $x^3 + y^3 + z^3 + w^3 = 0$ .

Here is a composite solution obtained by taking the best parts of several replies: Obviously  $y = -x$ ,  $z = -y$  give trivial solutions. Also, multiplying any solution by any cube yields another solution, so we assume no common factors. One solution is

$$3^3 + 4^3 + 5^3 - 6^3 = 0,$$

another is

$$8^3 + 6^3 + 1^3 - 9^3 = 0,$$

and a third is

$$10^3 + 9^3 - 12^3 - 1^3 = 0.$$

Infinitely many primitive solutions come from

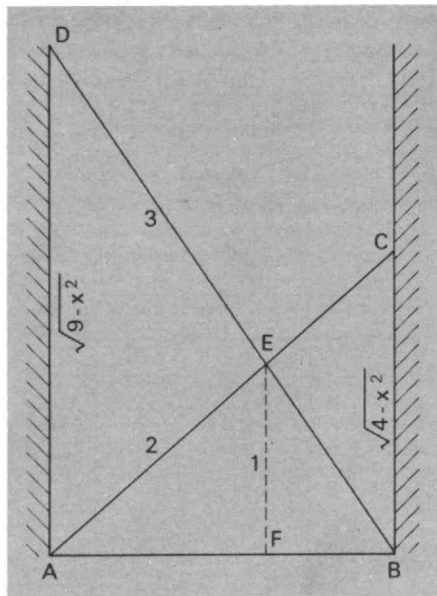
$$(n^3 + 1)^3 + n^3(n^3 - 2)^3 + (2n^3 - 1)^3 = n^3(n^3 + 1),$$

but this is hard to see (except to Euler, 1756). Even worse is the identity:

$$[m(m^3 + 2n^3)]^3 + [m(n^3 - m^3)]^3 + [n(n^3 - m^3)]^3 = [n(2m^3 + n^3)]^3.$$

This solution is from George E. Keith, Jr., Douglas J. Hoylman, Michael Krashinsky, R. Robinson Rowe, Russell L. Mallett, and John E. Prussing.

**27** A 60-ft. ladder and a 40-ft. ladder intersect 20 ft. above street level. How wide is the street?



R. Robinson Rowe submits the following: There is a simple geometric relation between the heights of intercepts on the walls and intersection of ladders, like the lens-focus formula:  
 $1/AD + 1/BC = 1/EF$ .

In this case, the ladders are multiples of EF, so it will be convenient to use EF as

a unit, with  $AC = 2$ , and  $BD = 3$ . Then, letting  $AB = x$ , the formula derives the relation

$$\sqrt{9 - x^2} + \sqrt{4 - x^2} = \sqrt{9 - x^2} \\ \sqrt{4 - x^2}.$$

Removing the radicals by squaring twice derives the octic

$$x^8 - 22x^6 + 163x^4 - 454x^2 + 385 = 0,$$

which I solved as a quartic in  $x^2$  by Horner's method, then by square root. Finally, since the unit was the EF, where 1 EF = 20 ft., the width of the street was 20x, or 24.623 714 48 ft.

Also solved by John E. Prussing, Russell L. Mallett, John Reed, George Van Arsdale, Lawrence M. Kieran, John D. Fogarty, Major F. H. Cleveland, William McClary, Frank G. Satkiewicz, W. Everett Swift, Clark Thompson, Arthur W. Anderson, Roy G. Sinclair, and George E. Keith, Jr.

**28** Solve the following two "concealment ciphers":

Pediatric researchers find that apparent learned errors attenuate reliable actions, channelling unavoidable patterns at neural circuitry. Assuming aggressive or regressive patterns at an early age tends to reinforce the unreliability.

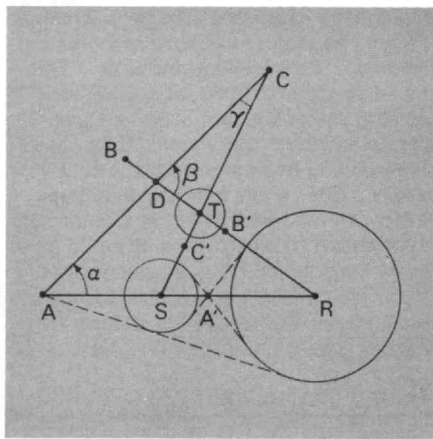
In legal disputes, the most rational attempts to respond to accusations necessitate thorough research, high standards, astute observation, the psychologist's feeling for allusion, and all possible care to avoid countersuits.

Douglas J. Hoylman has the following guesses:

"The first looks like 'spare the rod and spoil the child,' and would the second by any chance be 'look before you leap'?"

Also solved by R. Robinson Rowe.

**29** Show that given three unequal circles whose centers are noncollinear, the points of intersection (A, B, and C) of the three pairs of common tangents are collinear.



Russell L. Mallett's solution is:

Let R, S, and T be the circle centers and  $r$ ,  $s$ , and  $t$  the corresponding radii, with  $r > s > t$ . There are many more points of intersection than stated, unless the circles themselves intersect. Nevertheless,

there are always three points of intersection A, B, and C such that ASR, BTR, and CTS are straight lines. Simple geometry gives:

$$AR/AS \cdot CS/CT \cdot BT/BR = r/s \cdot s/r \cdot r/t = 1.$$

The figure shows A, B, and C not collinear. Let AC and BR intersect at D. Then the law of sines gives:

$$DR/AR \cdot CT/DT \cdot AS/CS = (\sin \alpha) / (\sin \beta) \cdot (\sin \beta) / (\sin \gamma) \cdot (\sin \gamma) / (\sin \alpha) = 1.$$

Combining these two results gives

$$BT/BR = DT/DR \rightarrow BT = DT,$$

so B must coincide with D and thus A, B, and C are collinear.

When the circles do not intersect, there are also pairs of common tangents which intersect in points A', B', and C', falling between circle centers. Each pair of these "interior" intersection points is collinear with A, B, or C.

Also solved by George E. Keith, Jr., Major F. H. Cleveland, Ted Leahy, Roy G. Sinclair, Douglas J. Hoylman, and R. Robinson Rowe.

**30** Given the following construction, prove or disprove that the resulting figure is a regular pentagon:

1. Draw a circle with center at O.
2. Draw line CD through the center of the circle.
3. Construct the perpendicular bisector to CD, line AB.
4. Construct the perpendicular bisector to OD, dividing it into two equal parts, OE and ED.
5. Place the compass point on E and the lead on A, and draw arc AF.
6. Place the compass point on A and the lead on F, and draw arc GH.
7. Leaving the compass with this setting, place its point on G and locate I on the circle.
8. Leaving the compass with this setting, place its point on H and locate J on the circle.
9. Draw the pentagon using points I, G, A, H, and J.

Trigonometric analysis of the problem shows that it reduces to demonstrating that  $\sin 36^\circ = (\sqrt{10 - 2\sqrt{5}})/4$ . Can this be done?

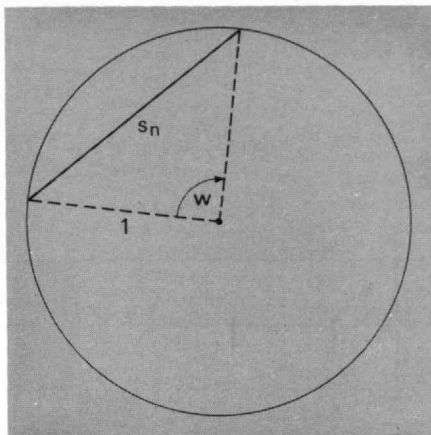
The definitive work on this problem comes from Howard A. Robinson, Chairman of the Department of Physics at Adelphi University, whose absorbing letter follows in its entirety:

The solution to this problem is well known and given in Bruckner's famous book, *Vielecke und Vielflach* (Leipzig, 1900). (On second thought I'm not so sure how famous the book actually is. I came across it by chance years ago in the New York Public Library from whence it shortly thereafter disappeared. Repeated search found it in no other library our librarian could uncover. However, it has recently turned up again in some other corner of that same library and I have had a copy made for Adelphi University. It is an invaluable compendium for the

solution of almost any problem in polygon or polyhedral geometry, and I would suggest that the Brandeis and M.I.T. Libraries should also have it).

The general solution for a polygon of any number of sides follows:

Consider a circle of unit radius with an  $n$ -sided regular polygon inscribed in it.



Let the length of a single side be  $s_n$  and the included angle be  $w$ . Then  $\sin(nw/2) = 0$ .

But  $\sin(nw/2)$  can be expanded into the following series:

When  $n$  is odd:

$$\sin(nw/2) = n \sin w/2 - [n(n^2 - 1^2)/3!] \sin^3 w/2 + n[(n^2 - 1^2)(n^2 - 3^2)]/5! \sin^5 w/2 \pm \dots$$

When  $n$  is even:

$$\sin(nw/2) = \{n \sin w/2 - [n(n^2 - 2^2)3!]\sin^3 w/2 + n[(n^2 - 1^2)(n^2 - 4^2)]/5! \sin^5 w/2 \pm \dots\} \cos w/2.$$

Thus if  $n = 5$ ,  $w = 72^\circ$ ,  $\sin w/2 = s_5/2$  (for a circle of unit radius) and  $0 = s_5^4 - 5s_5^2 + 5$ , from which

$$s_5 = \sqrt{5}/2 \pm \sqrt{5} \text{ and}$$

$$\sin 36^\circ = (\sqrt{10} \pm 2\sqrt{5})/4, \text{ as requested.}$$

The meaning of the  $\pm$  sign under the radical is of interest. In the theory of polygons the concept of polygon type (*Art espèce*) was early introduced. Thus if the circle be divided into  $n$  equal parts, each point can be joined to its next ( $a = 1$ ) to form a polygon of the first type; it can likewise be joined to its next but one ( $a = 2$ ) to form a polygon of the second type. In the case of the pentagon, ( $a = 3$ ) and ( $a = 4$ ) lead to the same two types of polygon as in the case when  $a = 1$  and  $a = 2$ . The plus sign gives the length of side of a pentagon of type two. (The nomenclature is due to Poincot).

Similarly for  $n = 10$  there will be four types ( $a = 1, 2, 3, 4$ ) and from the expansion  $s_{10}^4 - 8s_{10}^6 + 21s_{10}^8 - 20s_{10}^{10} + 5 = 0$ .

This can be factored into

$$(s_{10}^4 - 5s_{10}^2 + 5)(s_{10}^4 - 3s_{10}^2 + 1) = 0.$$

The roots of the first factor are identical with those of the pentagon and correspond to the lengths of the 10-sided figure of the second and fourth types. The second factor gives roots corresponding to the edge length of the first and third type, that is

$$s_{10} = \sqrt{(3 \pm \sqrt{5})/2} = (\sqrt{5} \pm 1)/2.$$

The original problem raised by Mr. Megill forms part of a wider problem known as the *Kreisteilung*. The problem of dividing the circumference of a circle into  $n$  equal parts using only a ruler and compass is very old, and it was long known that such a construction was possible for the cases  $n = 2^h, 3$  and  $5$  or any combination of these cases. Gauss showed that the construction is possible for every prime number  $n$  of the form

$$n = 2^{2^u} + 1$$

but that it was impossible for all other prime numbers and prime number powers since in these cases all solutions involved equations higher than second order, the roots of which are not constructable with ruler and compass. The cases  $u = 0$  and  $u = 1$  lead to the cases of  $n = 3$  and  $n = 5$  above. For  $u = 2$ ,  $n = 17$ , the construction which Gauss carried out himself and which has been widely discussed. For  $u = 3$ ,  $n = 257$  and for  $u = 4$ ,  $n = 65,537$ . Since both  $n$  are prime the constructions are realizable. The case of  $n = 257$  was constructed by Richelot in 1832 (*Crelles Journal* Vol. 9) and the case of  $n = 65,537$  construction was carried out by Hermes after a 10-year labor, the results of which were deposited in the collections of the Mathematical Seminar in Göttingen.  $u = 5, 6, 7$  do not lead to prime numbers; hence the solutions do not exist. No one (at least up to 1900) seems to have investigated the case of  $u = 8$ . Some of your readers may wish to pursue this matter further, although some suspicion seems to have arisen that  $u = 4$  is the last realizable case. Would any reader care to evaluate Mr. Hermes?

Also solved by Matthew J. Relis, David B. Smith, Paul Guilden, John E. Wieschel, James Marler, Jr., Zaul Hasan, John L. Sampson, Jan M. Chaiken, Richard Lipos, John L. Maulbetsch, James R. Schueler, Thomas Tredici, Gilbert Shen, Daniel E.

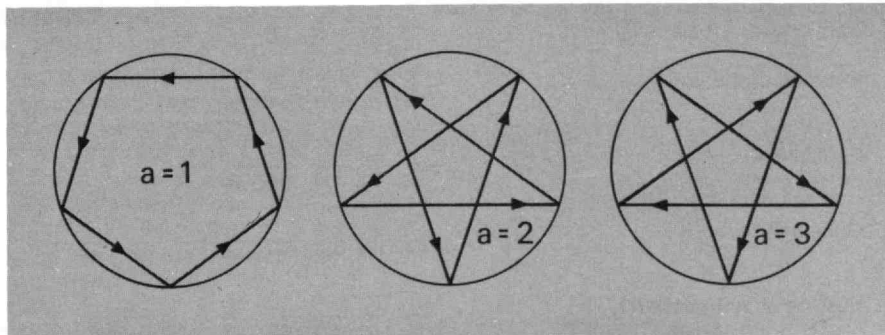
Jones, John W. Goppelt, Winslow H. Hartford, J. J. Cerullo, Howard S. Jarrett, C. Peter Lawes, D. Thomas Terwilliger, Robert D. Larrabee, F. R. Morgan, Major F. H. Cleveland, Robert A. Schumaker, William H. Peirce, Irving L. Hopkins, Edward S. Eby and Murray B. Sachs (jointly), Ruth Helfish and Timothy M. Barrows (jointly), Stephen Scheinberg, W. Allen Smith, Thomas W. Summers, Joel L. Ekstrom, William J. Wagner, Arthur A. Hauser, Jr., Norman C. Peterson, Roy G. Sinclair, Ted Leahy, George E. Keith, Jr., Russell L. Mallett, Arthur W. Anderson, Michael Krashinsky, and R. Robinson Rowe.

## Better Late Than Never

Jerry Blum has responded on problems 11 and 14.

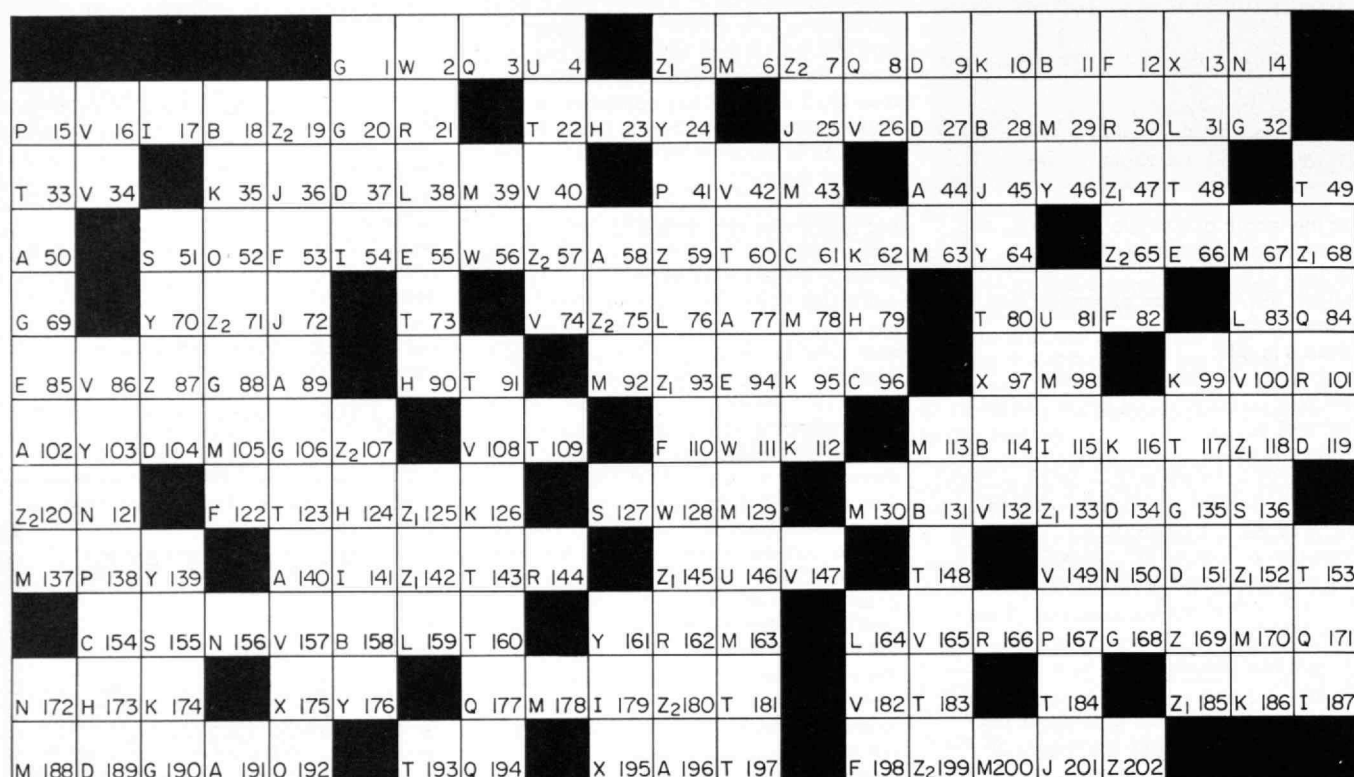
Julian Pathe attacks the published solution to problem 20. The original problem read, "A said to the farmer, 'I know you own a rectangular plot in that 20-by-20 section, and I know the area of your plot. Is the length greater than twice the width?' B said to the farmer, 'Before you answer let me state that I know the width, and I now know the length.' C said, 'I did not know the length, width, or area, but now I know the dimensions.' What are they?" Mr. Pathe writes:

I am distressed with the series of assumptions given for the solution in the May issue of *Technology Review*. They completely overlook the word *farmer*, thus failing to determine the units of measurement. These are rods and acres. B immediately knew the length when A said "20" (rods). C, "the remarkable mental gymnast" as stated in the February issue, knew that  $8 \times 20 = 160$  square rods = 1 acre. The published answer  $L = W = 10\sqrt{2}$  (microns?) is unsupportable. Is the future of our country safe in the hands of those who ignore facts and have never suffered for their eagerness to live with careless assumptions? I never saw the problem before the February issue and would like to know the "correct" answer. I have enjoyed reading some of the problems. My 13-year-old son last year did the "census taker" in two hours, but the effort required a \$2 bribe.



Allan J. Gottlieb is a teaching assistant in mathematics at Brandeis University, Waltham, Mass., 02154. Correspondence which will reach him before Labor Day should be addressed to 524 Beiling Road, Elmont, N.Y., 11003.

# The Prelate and the Clumsy Dancer



Use the definitions at the right to help define the words to which they refer; then enter the appropriate letters in the diagram to complete a quotation from a scientific work. The first letters of the defined words give the author and title from which the quotation is taken. Black squares in the diagram indicate the ends of words; when there is no black square at the right end of the diagram, the word continues on the next line.

The correct solution to this Tech-Crostic will appear in the October/November issue of *Technology Review*.

David L. Holt is Assistant Professor of Metallurgy at M.I.T. He will welcome readers' comments; address him in care of *Technology Review*, Room E19-430, M.I.T., Cambridge, Mass. 02139.

A. Pertaining to or abounding in peat moss.

50 140 196 58 89 102 191 77 44

B. In spinning machinery, the small grooved pulley by which the spindle is driven.

18 131 28 114 158 11

C. Residue which often results from combustion.

61 96 154

D. To separate a more fusible substance from one less fusible, by heat.

151 104 37 134 119 189 9

E. Blood of the gods.

66 85 27 94 55

F. Dozed.

12 110 198 122 82 53

G. Mandarin.

1 106 168 135 69 32 190 88 20

H. Type of motorscooter.

23 90 173 79 124



- I. Combining form meaning race, peoples. 54 17 141 187 179
- J. Fillet; strip. 79 36 115 25 45 201
- K. Womanhood. 95 186 35 99 126 62 10 116 174  
112
- L. Impervious to radiant energy. 31 83 164 76 38 159
- M. Twofold atomic crystalline point defect (3 words). 43 6 29 200 188 113 67 130 63  
92 178 137 78 105  
170 98 39 129 163
- N. Any of a genus (*Taxus*) of coniferous shrubs and trees. 121 14 156
- O. Colorless inert gaseous element giving a reddish glow in a vacuum tube. 192 172 150 52
- P. One of Israel's greatest kings. 41 138 167 15
- Q. Popular hostility to the law; also organization embodying this. 171 177 194 8 3
- R. To belong; to be a fixed element or attribute. 30 21 162 101 166 144
- S. Dynasty in China. 127 136 155 51
- T. The most stable form of the element at one atmosphere pressure and the temperature specified (an arbitrary reference point) (4 words). 143 117 73 109 60 148 160 153 183  
22 184 80 197 193 91  
181 33 123 49 48
- U. Exclamations of surprise, grief, a wish, etc. 146 81 4
- V. A particular combination of primary crystalline point defects. 34 132 157 42 86 26 74 40 182  
149 108 165 100 16 147
- W. Avoid deliberately. 56 2 128 111
- X. Auricular. 175 195 97 13
- Y. What the clumsy dancer has more than his share of (2 words). 46 24 70 103 176 139 64 161
- Z. English prelate and author. 87 59 169 202
- Z<sub>1</sub>. Modification which light undergoes, producing fringes of parallel light and dark or colored bands. 5 152 145 185 118 142 68 93 47  
133 125
- Z<sub>2</sub>. Star-shaped. 65 57 19 199 107 75 7 71 120  
180

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# The Posture(s) of Scientists

## Repression and Demonstration

To the Editor:

This letter is a comment on social repression and is intended as a challenge to the reason of Dr. Salvador E. Luria and those who would agree with him when, in reference to proposed legislation to limit funds to students "convicted" of crimes which involved the use of "force, disruption, or the seizure of property," he said: "They are repressive kinds of laws, and I hope that they are unconstitutional." (See *Technology Review for March, 1970*, p. 89.)

I ask, "Who is repressing whom?" It would seem to me that anyone who uses "force, disruption, or the seizure of property" as an exercise of free speech is repressing those "forced, disrupted, or deprived of their property." Furthermore, if any of the funds referred to were raised by taxation or donated by private citizens, certainly the rights of the furnishers of these funds are being repressed if the opportunity to approve or withhold their usage is denied. Surely this be the case where the funds are being spent in support of individuals bent on destroying institutions which they, who have furnished the funds, value and have constitutionally guaranteed to them.

It is quite unfathomable to me how anyone of truly liberal conscience can support or condone the use of "force, disruption, or the seizure of property" as a means to achieve political action when such action in and of itself is axiomatic of the abridgement of the rights of other parties. This is the action of the reactionary or the radical, but certainly not the liberal. It is interesting, though, how some people seem to advocate protecting our freedom at any cost even if it means putting all of us behind bars, while it seems others would guarantee our rights by disrupting our every activity and seizing all our property. Regardless from which direction—right, left, or center—to me, repression is repression.

In the early days of this nation, it is argued, violent demonstrations were part of the scene, and hence they are a wholly American activity. True as this may be, we are well to remember also that those involved were frequently dealt

with violently and sometimes with less than the greatest respect for their rights. (The doubter would do well to study the methods of President Andrew Jackson when dealing with dissenters in his pre-presidential days.) A checks-and-balances situation prevailed. In the intervening years we have fortunately come to expect ever greater protection of the rights of the individual, and until recently the individual has reciprocated by recognizing his responsibility to exercise ever greater self-discipline in return. Accordingly, until recently the system has stayed in equilibrium. Now some individuals, many of them students, are choosing to regress by no longer exercising this self-discipline, and the system is as a result becoming unstable. To some who I would categorize as radicals this may be the very object of their efforts, but to anyone concerned with individual rights or constitutional government this should be a matter of the greatest concern, since rebalancing or restabilizing the system may unfortunately prove difficult if not impossible without a complementary regression on the part of the behavior of those in authority.

Finally as regards repressing demonstrators, it is my hope that those in, or seeking, political office through constitutional means not only recognize and protect the rights of demonstrators, but do the same for those to whom it is an unacceptable hardship to take time off from job and/or family to take part in major demonstrations around the land. I suggest those in office not allow the repression of nondemonstrators.

William T. Deibel  
Marion, Ohio

*The author is a member of the M.I.T. Class of 1955.—Ed.*

### Professor Luria comments:

I cannot agree with Mr. Deibel. Irrespective of one's opinions about the activities of student protesters, I believe that legislation that adds further punishment, in the form of denial of financial support from a public agency, to a person because of a criminal conviction that does not carry loss of civil rights, may constitute double jeopardy and, therefore, may be unconstitutional. At any rate, I

view with alarm all legislations that single out for special punishment certain actions because of having been committed under political circumstances—for example, disruptive political demonstration (whether of the left or of the right).

## Mariculture: It Requires "a Special Breed of Men"

To the Editor:

As one engaged in mariculture, I wish to say a few words to those who are mystified by some facets of this infant industry, which was the subject of Robert C. Cowen's "Science Review" in April (pp. 8-9).

Successful fish farming will prevail only when presided over by a special breed of men. A fish farmer will have to identify with a sound philosophical approach and a genuine love for the products he is spawning and/or rearing. It must be mentioned that in nature one either hampers or promotes; there is little room for ignorance and greed. He who is interested in mastering the art of being in tune with nature will find this industry handsomely rewarding.

By virtue of its definition, mariculture represents true conservation. Greatest fatalities occur during juvenile stages in marine animal life; consequently, mariculture will reverse this cycle, thus converting the death rate into the survival rate.

In the realm of economics, it must be mentioned that mariculture could salvage our plundered fishing industries, if all programs were made to include returning a percentage of what is raised in captivity, back to the wild. Unless this or some other sizable restoration program is put into effect rather soon, the future of our fishing industries holds little promise.

It is no longer feasible to have popular thought in commercial fishing, sports fishing, and societies regarding mariculture as an executioner of our waters.

Albert J. Sesona  
Hialeah, Florida

## Billions to Trillions

To the Editor:

On page 65 of the May issue of *Technology Review* there is an article "Power Pollution—No Panic Proposed." This article expresses energy production in terms of billions of kWh. I suggest that the terminology should be trillions of kWh.

E. C. Plant  
Newark, N.J.

*Mr. Plant is Assistant to the Manager of System Planning, Electric Department, Public Service Electric and Gas Co. He is, of course, quite correct, and the error which he corrects should be attributed to Technology Review, not to the source quoted by the editors.—Ed.*

## The Human Use of Human Science

To the Editor:

I am a nonscientist replying to the question posed in the title of an article in your May issue ("Science Review" by Robert C. Cowen, pp. 8-9), "How Many Nonscientists Are Listening?" As a nonscientist, I was disturbed by Oak Ridge Director Alvin Weinberg's statement, "It is incredible but true that science and its technologies are today on the defensive." The part of the quotation that bothered me was not that science and technology were on the defensive, but that Weinberg found it so incredible.

Dr. Frederick Dainton, Chairman of Britain's Council on Scientific Policy, whom the author of the article quotes at length, decries the public's view of science. "Many outside of science think that scientists determine the course that the applications of their knowledge takes. Of course they don't. . . . Then, too, some think that science has its own momentum, a driverless bus going its own way, out of control." That's the point; science is *not* a driverless bus. It's a tool. M.I.T. students are known as "Tech Tools" because, when they graduate, they will be used as tools by those who have the money to pay them. My mother, another nonscientist, once asked why her style of living had not changed significantly in the past 20 years, in spite of the rapid advances in science. Answer: those who

had the money to pay the scientists and technicians put their human tools to work on military hardware, space research, and a few medical developments for the sick—but only those who can afford to pay for care. Spectacular developments, perhaps, but valuable only for those who pay for them. Who does pay for them? A survey of the scientists quoted in the article: Teller and Weinberg work for the U.S. government, Tischler for Merck, Dainton for the British government. Who gets the benefits? The U.S. government, Merck (read as a symbol of big business), the British government. Certainly not us, the nonscientists, because the money is in "defense," not in designing, say, a mass health care system.

Indirectly, we, the nonscientists, do pay for research and development in the form of higher taxes and prices. If you assume, as I do, that governments and corporations frequently don't serve the interest of their supposed constituents, then we are frequently getting nothing for something.

Nor is it merely a case of "taxation without representation." Science and technology often seem to be used against the people. After Earth Day, I need not dwell on pollution and that there seem to be no signs that science and technology are going to be applied significantly to the problem. Less frequently mentioned are the ways in which science is apparently used to maintain the status quo politically and economically. Better living through chemistry: mace, CS gas, and tear gas. Why has nobody produced an anti-tear-gas? Better living through psychology: the Hidden Persuaders and white, middle-class psychologists writing Scholastic Aptitude Tests that naturally discriminate against the nonwhite poor. Better living through systems analysis: the public so confused that they leave everything to the government, the urban dynamics of M.I.T.'s Jay Forrester that indicates that urban poverty can be reduced by not building, or even tearing down low cost housing, so that poor people won't move in from rural areas. A more extreme form of the same argument is that the war on poverty can be won by shipping all of the poor people out of the country.

I don't insist that all scientific research

stop tomorrow. It takes more than a paper in a theoretical physics journal to make a weapons system; it takes countless man hours of time from talented people. In addition to understanding the consequences of his work, I ask that a scientist avoid working on weapons and other politically motivated research and that he try to convince his colleagues to do the same. It is not enough to understand how certain information might affect other humans; the scientist must act like a human being on that understanding. As a start, he should constantly ask himself the question, "Why am I being paid; am I a tool?"

Edward D. Weinberger  
Cambridge, Mass.

*Mr. Weinberger, who has just completed his first year as an undergraduate at M.I.T., is a member of the Class of 1973.—Ed.*

## June Tech-Croscopic Solution

Einstein first postulated the existence of induced-emission processes from a consideration of the thermodynamic equilibrium between radiation and a system of emitting and absorbing particles.  
—H. R. Griem, *Plasma Spectroscopy*.





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TR-370

# Institute Review

## The M.I.T. Corporation for Undergraduates



*A standing ovation filled Rockwell Cage with sound when James R. Killian, Jr., '26, Chairman of the Corporation, resumed his seat having announced on Alumni Homecoming Day, June 15, that*

*he would retire in June, 1971, after more than 40 years of administrative work at M.I.T. Later, pressed by continuing applause, he and Mrs. Killian stood together to acknowledge the tribute from 1,000*

*alumni and guests. (Photo: Donald L. Estes, '71)*

### **James R. Killian, Jr.: "There Must Be a Terminal Point"**

James R. Killian, Jr., '26, who has had a central role in the leadership of M.I.T. for 22 years and has been a member of its administration for 32 years, will retire in 1971 from full-time service as Chairman of the M.I.T. Corporation.

The announcement, made by Dr. Killian himself at the 1970 Alumni Homecoming Day luncheon on June 15, drew a standing ovation for him and Mrs. Killian from nearly 1,000 alumni and guests in Rockwell Cage.

Responding to Dr. Killian's announcement, Howard W. Johnson, President of M.I.T., said that Dr. Killian's "leadership, wisdom, and high purpose have set standards to which the rest of us aspire. He has stood always and striven always for what is best for M.I.T.—and

with a singular style and selfless devotion he has helped to shape the character of the Institute.

"Everyone associated with the Institute—students, staff, faculty, Corporation, alumni—will feel the loss of Dr. Killian's full-time service in one measure or another," Mr. Johnson continued, "but no one will feel the loss more than I. We look forward to having the great benefit of his counsel and support for many years to come."

Dr. Killian made his announcement by reading the letter which he had on June 12 presented to the Corporation:

"Several months ago I reported to the Executive Committee of the Corporation my desire for personal reasons to conclude my responsibilities as a full-time officer of the Institute not later than June 30, 1971. By that date I will have

served, as requested by the Corporation, beyond the Institute's normal retirement age. By that date I will have been associated with M.I.T. for 48 years.

"In requesting your acceptance of my retirement from full-time duties, I express to the Corporation my sense of privilege and gratitude in having served first as your President and then as your Chairman. The leadership, wisdom, and high purpose of this governing body have been major factors in the advancement of the Institute.

"It has also been a rewarding experience for me to serve in support of President Johnson and his administrative associates, and in support of the M.I.T. faculty. It is the Institute's great good fortune to have his and their steadfast leadership along with an exceptionally strong student body and loyal alumni in these critical days."



*William L. Verplank, S.M., '67, is both engineer and artist, and his combination of those skills in the classroom helped to win him the Institute's highest award for teaching—the Goodwin Medal—for 1970. He is a natural teacher "who simply started teaching," said Irwin W. Sizer, Dean of the Graduate School, in introducing Mr. Verplank to the Commencement Luncheon audience on June 12.*

In reporting to the alumni, Dr. Killian said, "I reaffirm my confidence in the soundness and unity of this institution and its undiminishable role as one of the great institutions of the world.

"And I thank you, my fellow alumni, for happy associations and for the opportunity to share with you a proud, ongoing commitment to the advancement of this institution. . . . For both me and Mrs. Killian, these have been intense years—but years of fulfillment and reward, and we are grateful for them. But there must be a terminal point," he said.

The timing of Dr. Killian's announcement made organized tributes to him impossible during the 1970 Alumni Homecoming, but plans are already being discussed for activities in honor of Dr. and Mrs. Killian during the 1970-71 year.

Dr. Killian's retirement will mark the 48th anniversary of his association with the Institute, beginning as a student in 1923. After his student days he remained at the Institute to work on *Technology Review*, M.I.T.'s magazine, of which he was Editor from 1930 to 1939. He later served as Executive Vice-President (1943-45) and Vice-President (1945-49) of the Institute before being chosen as President in 1948.

The first alumnus to lead the Institute, Dr. Killian was inaugurated in 1949 and served as President until called to Washington, eight years later, to be Special Assistant for Science and Technology to President Dwight D. Eisenhower—and thus to serve as the first Presidential science adviser. Dr. Killian returned to M.I.T. in 1959 to the full-time post of Chairman of the Corporation.

In addition to his contributions through M.I.T. and in government assignments to technological education and science and engineering administration, Dr. Killian has led in the development of public television, in community relations activities, and in such public service programs as the Atoms for Peace Awards. He is a member of the National

Academy of Engineering and holds many honorary degrees and other national awards.

### Withdrawal and Probation

The Committee on Discipline has recommended to President Howard W. Johnson that seven M.I.T. students charged with participating in the occupation of the offices of the President on January 15 and 16 (see *Technology Review* for February, pp. 72A-72D) be required to withdraw from the Institute until June, 1971.

Three other students similarly charged before the Committee were placed on disciplinary probation, and the hearing against one student was postponed. The cases were brought before the Committee by two officers of the Institute following court action on criminal complaints arising out of the occupation (see *Technology Review* for April, p. 97).

In announcing the results of its deliberations, which included hearings on individual charges against each student, the Committee on Discipline said it "felt that the attack upon the Institute through the activities of January 15-16 was severe and seriously threatened its operations and educational standards."

In all, the Committee reported, it held some 32 hours of hearings; on two occasions, it said, "a reported 35 to 50 people tried to gain access to the hearing room and reportedly pulled fire alarms, stamped on the floor outside and above the room, and engaged in physical confrontations with officers of the Institute attempting to prevent their entry into the hearing room."

If the Discipline Committee's recommendation is accepted, the seven students required to withdraw could not apply for readmission to M.I.T. until June, 1971; their applications, whenever made, would require approval of the Committee.

### For Effective Teaching

William L. Verplank, S.M.'67, an instructor in mechanical engineering who brings

talents as an artist as well as an engineer into his M.I.T. classrooms, was awarded the coveted Harry Manley Goodwin ('90) Medal for outstanding teaching abilities at the Commencement Luncheon on June 12.

Introducing him to the audience, Irwin W. Sizer, Dean of the M.I.T. Graduate School, noted that Mr. Verplank's teaching activities began in an unorthodox way: even as a graduate student, said Dean Sizer, Mr. Verplank "simply started teaching" by inviting students into the Department's Man-Machine Systems Laboratory. His work has continued in a similarly informal way, and that is one of the secrets of his success; but there have been formal results as well, including a new sophomore subject in engineering systems and design.

One of the Department faculty nominating him for the Goodwin Award—which carries a \$500 prize as well as the medal—wrote to the committee that Mr. Verplank "has an unusual ability to work with students—to thereby involve them in the task—without himself doing the task for them. He never seems to place himself above them in a pedantic way."

Other teaching awards announced at the Graduation Exercises in June included the Everett Moore Baker Award "in recognition of exceptional and demonstrated interest in undergraduate teaching" to Duncan K. Foley, Associate Professor of Economics, and William B. Crout, Lecturer in Humanities; the Supervised Investors Services, Inc., Awards for graduate students in electrical engineering for excellence in teaching to Thomas B. Jones, Jr., '66, Murray Edelberg, S.M.'67, Richard L. Brenner, and Irvin S. Englander; and David E. Schultz Awards of \$1,000 to Donald E. Nelsen, '61, and Stephen D. Senturia, Ph.D.'66, both Assistant Professors of Electrical Engineering.



# The M.I.T. Commission: A New Plan for Undergraduate Education

*The following statement written for Technology Review by Kenneth M. Hoffman, Professor of Mathematics who is Chairman of the Commission on M.I.T. Education (see Technology Review for October/November, p. 100, and December, p. 103), represents one of the first reports of Commission deliberations to the M.I.T. community. Professor Hoffman emphasizes that no decisions have yet been reached, nor have all the questions about this proposal been resolved even in the minds of Commission members. But the refocus on the education of first- and second-year undergraduate students at M.I.T. has been a recurring theme in Commission deliberations, and so Professor Hoffman has chosen to broaden discussion of this topic to the entire Institute community through Technology Review. Readers are invited to communicate directly with Professor Hoffman or through the Commission's Alumni Advisory Committee (see right).—Ed.*

The most radical proposal for change in the format of undergraduate education at M.I.T. which has been discussed by the Commission on M.I.T. Education would call for the establishment of a new administrative entity, responsible for education at the level of the freshman and sophomore years (and possibly what is now the last year of high school). Such a change would present problems as well as opportunities for M.I.T. and would need to be preceded by widespread discussion. Let me try to clarify the concept and give some of the background for our thinking thus far.

## The Neglect of Undergraduate Education

Since the Second World War, the universities in this country have changed considerably. The scope of their efforts in research and education has increased significantly. A great deal of this was made possible by large amounts of federal funding, especially for research and graduate education in science and technology. We are all aware of the gains which have accompanied this growth, just as we are aware of a number of institutional problems which have arisen (financial dependence on the government, who is serving or leading whom, etc.).

It is important to notice what has happened to undergraduate education during this period: some aspects have been neglected, and—to a certain extent—the “college” has lost its identity within the university. These are some of the contributory factors:

◇ The graduate departments (or the graduate education function of the departments) have grown in size and power, so that their goals have come to dominate the university. The fundamental purpose of the university is described as “the pursuit of knowledge” rather than “education.” As Joseph Tussman so aptly put it: “[The university] is arrayed under the familiar departmental banners and advances against the unknown on all fronts.”

◇ As a consequence, the undergraduate program has become directed principally at pregraduate education or “training,” and the effects of this trend reach down even into the secondary schools. The goals of undergraduate education which would make it more than one stop on the road to

## A Role for Alumni in Setting Educational Goals

An advisory committee of 15 prominent M.I.T. alumni has begun the task of focusing for the Commission on M.I.T. Education (see left) the views and experiences of Institute graduates as they relate to the Commission's task: to define goals and methods for M.I.T. and for technological education in the decade just beginning.

The advisory committee, chaired by William S. Edgerly, '49, Financial Vice-President of Cabot Corp., includes: Shintaro Asano, S.M.'61, President of Shintron Co. (Cambridge) W. Gerald Austen, '51, Chief of Surgery at Massachusetts General Hospital Richard A. Carpenter, '64, of Index Systems, Inc. (Boston) Robert C. Casselman, '39, Director of the Office of Modernization, Commonwealth of Massachusetts Thomas F. Creamer, '40, Executive Vice-President of the First National City Bank (New York) Thomas H. Farquhar, '60, of the Massachusetts Investors Trust (Boston) Thomas F. Jones, Jr., Sc.D.'52, President of the University of South Carolina Paul V. Keyser, Jr., '29, President of Arthur D. Little, Inc. Adolf F. Monosson, '48, President of the Boston Computer Group, Inc. Philip H. Peters, '37, Senior Vice-President of the John Hancock Mutual Life Insurance Co. (Boston) Paul P. Shepherd, '53, Vice-President of Cabot, Cabot, and Forbes (San Francisco) A. Graham Sterling, Jr., '48, Director of Procurement for Texas Instruments, Inc. (Dallas) Walter H. Stockmayer, '35, Professor of Chemistry at Dartmouth College.

In contrast to the M.I.T. Commission's several task forces (see Technology Review for March, pp. 98-99), the Alumni Advisory Committee will not take on an independent “think tank” assignment. Instead, says Mr. Edgerly, its principal task will be to serve as an expeditor of communication between Commission and alumni on the major educational and environmental questions which are before the Commission:

research have faded into the background.

◇ Professionalism in academic disciplines has grown to such an extent that the principal loyalties of many faculty members have moved outside the university to their professional associations. Insofar as loyalties remain inside the university, they are focused in departments. Very few faculty members have a concern for the overall educational program, and teaching has come to play a weak second fiddle to research. The very definition of "teaching" has narrowed to "lecturing on a subject in which one is an expert."

◇ Enrollments have swollen, as a college degree has become the passport to a significant occupation. Our technological society needs specialists, and the universities have become the principal institutions for training (educating?) them. The trend toward specialization has affected educational programs and the nature of the faculties. At some institutions, the influx of students has greatly altered the character of the student body and the university has been slow to adapt itself.

How can or should M.I.T. lead in the application of technology to the problems of society? To what extent should M.I.T. devote resources to innovation in higher education? How can or should M.I.T. extend the learning period both to younger and older ages? What is the proper balance between research, graduate education, and undergraduate education to M.I.T.? Finally, how can we achieve a better integration of human and social considerations with technology in the educational experience? In general how can the educational experience of M.I.T. be made more useful?

The Commission plans to make a preliminary report in October, which will coincide with the timing of the Alumni Officers Conference. Mr. Edgerly says the Committee hopes to use that occasion to organize some discussion of these questions and of the Commission itself with alumni. Activities continuing throughout the 1970-71 academic year are also anticipated.

The Institute has been affected in varying degrees by each of these developments, especially the emphasis on graduate and pregraduate education. Professionalism has always borne a special relationship to M.I.T., and its effects on our undergraduate program must be discussed more fully than can be attempted here. Our undergraduate population has not grown in size for many years; however, changes in the character of the student body are discernible here as elsewhere. (One significant trend may be indicated by the fact that one-third of next year's sophomores elected to proceed without a specified major.)

There has been a consistent concern with undergraduate education at the Institute. But most of the Commission members feel that we must reassert and/or redefine the goals of our undergraduate education. We assume that M.I.T. will continue to be primarily a scientific and technological institution, and that as such it will continue to provide an education in the analytic methods which are the backbone of science and technology. Nevertheless, we see three basic things which must be emphasized more strongly if M.I.T. is to stay at the cutting edge of society's attempt to negotiate successfully the next several decades.

#### *1. Integration of knowledge from various disciplines.*

For most people this concept usually means "interdisciplinary" curricula or "general education." What we have in mind could probably be called interdisciplinary education, if that were properly understood. The modern problems of civilization will require that our students develop the ability to synthesize as well as to analyze. We tend to seek the remedies for those problems in interdisciplinary cooperation in research and teaching. If such cooperation consists of bringing together a collection of experts, each "doing his own thing," it is doubtful that we will be able to grapple successfully with modern problems or that students will develop the ability to synthesize or integrate knowledge, except by accident. Given the shortage of wise men, our hope seems to lie in bringing together faculty members from different disciplines to cooperate fully in the development of interdisciplinary educational programs which they will all teach.

#### *2. The relation of facts and values.*

In a sense, this is a special case of the previous area of emphasis; however, it is so important that it deserves to be listed separately. We have not successfully integrated the humanities and social sciences into the undergraduate program at M.I.T. We have built up the Humanities Department and required students to take a number of courses (some of them truly fine) which the Department offers; but the humanities have not been taken into the soul of the Institute. We will hear the terms "hard" and "soft" thinking too often, and we define engineers or scientists without including intellectual tools from the humanities and social sciences in their required mental kit.

This is particularly significant today, because the most difficult problems which we face are those which relate facts and values. A practicing civil

engineer, for example, must be able to do much more than write or speak well and know how to "get along with people." He will more than likely find himself in the middle of a debate with several sectors of a community over the location and nature of his proposed construction. The groups will have different sets of values and he must be able to discuss and debate those values with them. It's a far cry from the days of one clearly identifiable client.

The intellectual problem of relating facts and values is quite difficult, as is the accompanying educational problem. But the responsibility for addressing it at M.I.T. is inescapable.

### **3. Education for citizenship in a democracy.**

To some people these days, this sounds a bit "square". But it has never been more important for our students to understand the nature of a democracy and their roles as individuals in it. They must develop autonomy in the sense that they can make decisions based on their own principles and the ends they hope to achieve. They must come to understand that democracy comes somewhat unnaturally to men—that freedom is not the absence of all constraints. The search for individual identity is extremely important in undergraduate education and must be more of a concern at M.I.T. than it has been in the past. It is important that the search go on in a broader context.

### **To Broaden the Undergraduate Experience**

If we are to emphasize these things more, then the focus of at least part of our undergraduate education must be the individual, as much as the body of knowledge. There must be a deep concern for the quality of his whole experience. Such a goal cannot be accomplished through tinkering with our advising system.

Educational programs and emphases must be carried out by the faculty in cooperation with the students. As long as all curricula and faculty rewards are controlled by departments, it is doubtful that significant changes in emphasis can be effected. A commission, or some other group, cannot tell faculty members what to do; but it can try to convince them of the desirability of some changes which will make it easier to participate in new educational efforts and encourage such participation through a modified reward system.

Thus we come to the idea of establishing an administrative entity with partial control over the undergraduate program. We have discussed the appointment of a new dean with organizational responsibility for the first two years. It is not intended that he should administer a separate faculty; but he (and faculty who work with him) would have a voice in the choice of new faculty as well as in the promotion and reward of those faculty members who teach in the programs of the first two years.

Notice that we are discussing *programs*, not a single program for all students. These programs would have to be developed by groups of faculty members. They could vary enormously in style, incorporating at the outset the several educational experiments which are already underway at M.I.T.

The basic goals of the education at this level would have to be spelled out very clearly before the faculty could accept the idea of a "lower division." The details of appointment and rewards also have to be worked out. The whole idea must be presented as the opportunity to do something significant where there is a clear educational need.

We feel that the need is there. This does not make it certain that the new "division" should be established, nor does it tell us how to work out all the practical details. There is no institution to model on—but then M.I.T. has never been a mimic in education. However, the feeling has persisted in a majority of the members of the Commission that some change of this type is called for.

### **Tributes on Retirement**

Ten members of the M.I.T. faculty and academic administration, reaching the mandatory age, retired from full-time service at the Institute on July 1; they received a standing tribute from their colleagues when President Howard W. Johnson announced the list at a Faculty meeting on May 13.

The ten are:

Henry G. Houghton, S.M.'27, Professor of Meteorology  
Charles Kingsley, Jr., '27, Associate Professor of Electrical Engineering  
M. Stanley Livingston, Professor of Physics  
Elsa Naber, Assistant to the Registrar  
Augustus R. Rogowski, S.M.'28, Professor of Mechanical Engineering  
Bruno Rossi, Institute Professor and Professor of Physics  
Robert R. Shrock, Professor of Geology  
John B. Wilbur, Sc.D.'33, Consulting Professor of Engineering  
Francis E. Wylie, Director of Public Relations  
Jerrold R. Zacharias, Institute Professor and Professor of Physics

(Personal tributes to each of these, provided for the *Review* by colleagues, are published in adjacent columns on pages 86-88.)

Professor Houghton first came to M.I.T. in 1926, following graduation from Drexel Institute of Technology; he joined the Department of Electrical Engineering upon receiving M.I.T.'s S.M. degree in 1927. Thereafter for ten years he was at the Institute's Round Hill Research Station, where his research work was devoted to the properties of fog. Professor Houghton joined the Meteorology Department in 1939, became associate professor and Executive Officer in 1942 and Professor and Head of the Department in 1945. He holds the Robert M. Losey Award (1940) from the Institute of Aeronautical Sciences, the Charles F. Brooks Award (1958) of the American Meteorological Society, and an honorary Doctor of Science degree (1947) from Drexel; he has been President (1946-48) and Secretary (1956-57) of the American Meteorological Society and a member of many professional committees.



A Fellow of the American Institute of Electrical and Electronics Engineers, Professor Kingsley is well known in his profession as the author of two standard works: *Magnetic Circuits and Transformers* and *Electric Machinery*. Except for two leaves of absence, he has spent his entire career at the Institute, where he received S.B. (1927) and S.M. (1928) degrees in the Department of Electrical Engineering. His teaching career began in 1929, and he has done both teaching and research in the field of servomechanisms. During 1953-55, while on leave of absence from M.I.T., Professor Kingsley taught at the Thayer School of Engineering at Dartmouth College, helping to establish there a course and laboratory for the teaching of servomechanisms.

M. Stanley Livingston has been involved in the design and construction of high-energy particle accelerators since the beginning of his career as a physicist. He studied at Pomona (A.B., 1926), Dartmouth (M.A., 1928), and the University of California (Berkeley) (Ph.D., 1931), and immediately thereafter he was associated for three years with Ernest O. Lawrence in the original development of the cyclotron. For four years from 1934 to 1938 at Cornell University Professor Livingston worked with Hans Bethe in a comprehensive survey of experimental nuclear physics; then he came to M.I.T. to build the Institute's 16 MeV cyclotron, and he has continued as a member of the Institute's faculty ever since. From 1946 to 1948 Professor Livingston was Chairman of the Accelerator Project at Brookhaven National Laboratory, concerned with the design of the Laboratory's 3 BeV Cosmotron and other accelerators; in 1952 he wrote the discovery paper on the principle of alternating gradient magnetic focussing; beginning in 1956 for 11 years he designed and later directed operations of the Cambridge Electron Accelerator, operated jointly by Harvard and M.I.T.; and since 1967 he has been on leave from M.I.T. to serve as Associate Director of the National Accelerator Laboratory, where he has been associated with the design and construction of the 200-400 GeV proton accelerator.

Elsa Naber has been Assistant to the Registrar since 1955. She studied mathematics at Radcliffe (A.B., 1926) and first came to the M.I.T. Registrar's Office in 1928. Her invaluable services to the Institute have included keeping in order all staff records, organizing and supervising each year's catalogue, and coordinating commencement exercises.

A specialist on internal combustion engines, Augustus R. Rogowski was for many years Director of M.I.T.'s Sloan Automotive Laboratory. He studied mechanical engineering at Yale (B.S., 1927) before coming to M.I.T. for graduate study (S.M., 1928) and then for six years held positions in structural design in the aeronautical industry before returning to the Institute as Assistant Professor of Mechanical Engineering. His professional papers have been on alcohol-gasoline fuel blends, the air ca-

capacity and scavenging of internal combustion engines, and instrumentation and test equipment for research on engine performance and behavior.

Bruno Rossi began studies of cosmic rays 40 years ago as a student at the Universities of Padua and Bologna, Italy; after completing graduate study he held positions at the Universities of Florence and Padua until 1938, when Italy's fascist government dismissed him from teaching and he chose to leave the country. From then until 1946, when he came to M.I.T., Professor Rossi worked at the Institute of Theoretical Physics in Copenhagen, the University of Manchester (England), the University of Chicago, Cornell University, and the Los Alamos National Laboratory. At M.I.T. he was a principal in the founding of the Laboratory for Nuclear Science, and he has been in charge of its cosmic ray group for 24 years. He holds the Research Corporation Scientific Award, the Order of Merit of the Republic of Italy, and an honorary professorship at the Universidad Mayor de San Andres in La Paz, Bolivia.

A native midwesterner, Robert R. Shrock studied at the University of Indiana (A.B., 1925, A.M., 1926, and Ph.D., 1928) and then joined the teaching staff at the University of Wisconsin where he remained until coming to M.I.T. in 1937. Following appointments as associate professor, Executive Officer, and professor in the Department, Professor Shrock became Acting Head of the Department of Geology in 1949; and he served as Head from 1950 to 1965. He was instrumental in developing M.I.T.'s close contacts with industries in the earth sciences and its increasing emphasis in oceanography, culminating in cooperative arrangements between the Institute and the Woods Hole Oceanographic Institution. He is known for research in paleontology and sedimentology.

John B. Wilbur's engineering career began with the Maine Central Railroad Co. in 1928, following study and teaching in the M.I.T. Department of Civil Engineering (S.B., 1926, S.M., 1928); one year later he served as bridge designer and detailer with the New York Central Railroad, and in 1930 he returned to M.I.T. for teaching and further graduate study (Sc.D., 1933). Serving on the faculty after 1934, he was Director of the Structural Analysis Laboratory from 1936 to 1946 and Head of the Department of Civil Engineering from 1946 to 1961, when he became Consulting Professor of Engineering on a part-time basis. Meanwhile, he had served as a consultant on the design of bridges across Lake Champlain and the Cape Cod Canal, and he was chief engineer in the design of the Boston Central Artery. Since 1961 he has participated in many educational and research projects at the Institute, especially those at a comprehensive, professional level.

Francis E. Wylie has been M.I.T.'s Director  
*Continued on page 90*



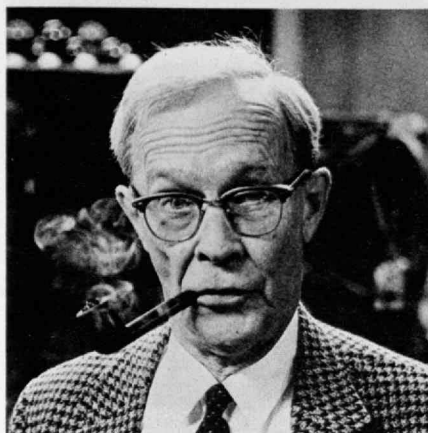
Henry G. Houghton, S.M.'27  
Professor of Meteorology;  
Head of the Department

*Over thirty years ago Henry Houghton was well known for his research into the physical characteristics of fog. The research involved painstaking field and laboratory studies of fog droplets. It is a tribute to his personal qualities that he could serve as the Executive Officer and Head of the Department of Meteorology for 28 years and still today be referred to affectionately by staff and former students as the "drop king."*

*Few department heads can match Henry's record as an educator. It is often said that the way to learn a subject is to have to teach it. Because Professor Houghton's formal training was in electrical engineering, all of his meteorology has been self-taught. His success at this is shown by the fact that three subjects developed by him still form an active part of today's curriculum in dynamical meteorology, physical meteorology and oceanography. Throughout his long tenure he taught one subject practically every term and served as faculty adviser for many graduate theses. This close contact with graduate students certainly contributed to Professor Houghton's ability to make significant research contributions to meteorology despite administrative duties and the many calls of the meteorological profession.*

*Dr. Houghton is acclaimed by his colleagues as a leader in that profession. Let me cite just three examples: He was President of the American Meteorological Society in 1946-48, during the difficult years of its transformation into a professional scientific society; he was the first Chairman of the Board of the University Corporation for Atmospheric Research in Boulder, Colo.; and he published a paper in 1968 "On Precipitation Mechanisms and their Artificial Modification" which is recognized as a major scientific contribution to the controversial field of weather modification. Indeed, "what does Henry Houghton think of it?" has been a byword in the councils of American meteorology for many years.*

James M. Austin, Sc.D.'41  
Associate Professor of Meteorology



**Charles Kingsley, Jr.**  
Associate Professor of Electrical  
Engineering

Professor Kingsley's long career in engineering education has been primarily devoted to teaching and research in the area of electromechanical energy-conversion devices. His many contributions during these years have led to profound changes in the approach to this subject not only at M.I.T. but also on the national scene.

During the 1930's, he was the principal author of *Magnetic Circuits and Transformers*, one of the textbooks in the M.I.T. Electrical Engineering Department series. Like the other books in the series, this text is still widely known for its thoroughness, depth, and clarity of treatment. In the early 1950's he co-authored the book, *Electric Machinery*. This was in many respects a pioneering work because of its successful attempt to unify the theoretical approach to all types of motors and generators. It can be said to be the first step in the development of broad teaching methods in electromechanics, a development which is still continuing at M.I.T. today. As Kingsley reaches the time for retirement from full-time service, he is very busy preparing revised editions of both of these works.

Two important elements have been present in Professor Kingsley's writing and teaching: clarity and precision of thought, and a serious concern for practical applicability to the engineering world. The many students who have come under his influence will immediately recognize these attributes.

Arthur E. Fitzgerald, Sc.D.'37  
Dean of the Faculty  
Northeastern University



**M. Stanley Livingston**  
Professor of Physics

For nearly four decades Stan Livingston has been among those at the forefront of the remarkable advances in the techniques of particle acceleration that have made possible even more remarkable advances in our understanding of the atomic nucleus and its constituent parts. During that period the cyclotron of Lawrence and Livingston and its lineal descendants, the synchrotrons, have increased the maximum energy of laboratory particles from less than 1 million to almost 100,000 million electron volts, with several hundred thousand million in early prospect at the N.A.L. machine on which Stan has most recently worked.

Stan has himself been a leader in many of the most important steps along the way, including: construction and operation of successively larger and greatly improved cyclotrons at Berkeley, Cornell, and M.I.T.; design of the Brookhaven Cosmotron—the first successful proton synchrotron and the first accelerator to exceed 1 billion volts; co-invention of alternating-gradient focussing, basic to all modern very large synchrotrons; construction and operation of the Cambridge Electron Accelerator, which markedly raised the peak energy of electron synchrotrons.

That Stan's career has bridged, indeed has coincided with, the whole development of particle accelerators is fortunate in many ways; he has always been a fountainhead of accelerator lore, carrying it from place to place as occasion demanded; his several books and many articles on accelerators form a unique record and are indispensable tools for his colleagues, both present and future; his contagious enthusiasm and perpetual optimism, both spoken and written, have inspired many others.

Such a coincidence cannot happen again in this important and fascinating field. Science and mankind are fortunate that it happened once.

Leland J. Haworth  
Former Director of the National Science  
Foundation



**Elsa Naber**  
Assistant to the Registrar

I first knew Elsa when I returned to M.I.T. as Assistant Registrar in 1948. Joseph McKinnon and I were the only two males in the Registrar's Office at that time, ably assisted by about 30 ladies of which Miss Elsa Naber was one of the most prominent in my recollections. Her background was first described to me as a mathematics major from Radcliffe College who had been hired upon her graduation by Mr. McKinnon to assist him in developing the scholastic rating system still in effect. She was meticulous to the highest degree. In the time that she was responsible for gathering and editing the entire catalog her work was generally faultless and I can still recall her obvious displeasure when a single misspelling was detected in one of the published catalogs. Graduation was another responsibility for Elsa, and it was a real challenge for her to be part of the team which put the correct diploma in the right hands during the Commencement ceremonies.

Elsa in my recollections was always an immensely thorough worker in anything she accomplished, and she thoroughly enjoyed detailed work. The faculty and staff of the Institute always had tremendous respect for her and the key role which she served. The many girls who worked directly for her over the years contributed to a very fine team, with Elsa in the leadership role—they enjoyed her and she enjoyed them.

It is not often in one's lifetime that he has the privilege of close association with one completely dedicated to carrying out the policies of the institution being served, and Elsa Naber certainly is one. The Institute has benefited tremendously from her many years of service.

Robert E. Hewes, '43  
Dean of Students  
University of Connecticut





**Augustus R. Rogowski, S.M.'28**  
Professor of Mechanical Engineering

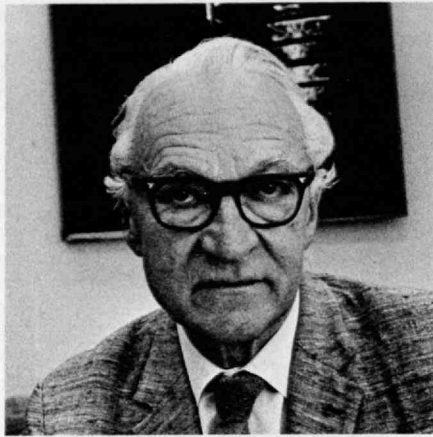
While Professor Rogowski has shown strength in all aspects of his work at M.I.T., his outstanding characteristic has been his success as a teacher of both undergraduate and graduate students and as a director of student research projects. In these respects he has had unusual rapport with his students.

Professor Rogowski has also shown great resourcefulness in planning and supervising useful research projects in the field of internal-combustion engines. His work in this field has resulted in significant research supported by such major organizations as General Motors Corp., Cummins Engine Co., Ford Motor Co., the National Science Foundation, and the Cooperative Research Council (which represents through a coalition most of the large automotive and fuel companies). His work in Diesel combustion and the investigation of the causes of cycle-to-cycle variation in spark-ignition engines has been of a high caliber. He has been able to devise means of operating a spark-ignition engine on a very lean mixture, a development which may have far-reaching effects in the control of atmospheric pollution. In addition, he has been able to demonstrate that very small Diesel cylinders can be run at high speed and efficiency.

Professor Rogowski's publications include a basic text on internal-combustion engines, a number of research papers for the National Advisory Committee for Aeronautics (now N.A.S.A.), and many papers published by the American Society of Mechanical Engineers and the Society of Automotive Engineers. He has also been a consultant to a number of important organizations.

His retirement marks a new turn in a 34-year career of loyal and skillful service to M.I.T.—and a new era for students who must find other mentors for the techniques and discipline of engineering research.

**C. Fayette Taylor, '29**  
Professor of Automotive Engineering,  
Emeritus



**Bruno B. Rossi**  
Institute Professor; Professor of Physics

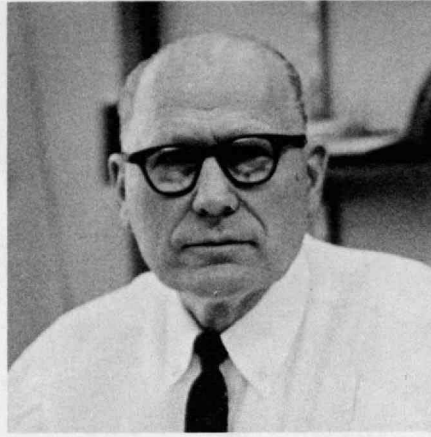
Through the fog of 25 or 30 years I can no longer make out the first time I heard Bruno Rossi describe an experiment he had done. Neither the place nor the purpose nor the outcome remain clear. But the informing principle of his work and his mind are sharp as this morning. For he is the experimenter-in-depth. A Rossi experiment is no single result, no mere set of stated conditions with the apparatus arranged to produce them, the data, the neat inference. Not at all. His experiment is a whole cluster of results, a set of little experiments which hang beautifully together, testing every system and every assumption until the result is beyond real questioning.

In those old days, he always had a set of Geiger counters with maybe an ion chamber or two, some counters to give assent, some counters to veto, some counters to mark coincidences. Everyone else used similar schemes to study cosmic rays. But other people relied on hope (and on Rossi's earlier results) to give credence to their set-ups. Not Bruno. Like the master he is, he deftly moved this counter, disabled this one, added lead here, delayed a pulse there, until he had so guarded his single new result within a tight net of demonstrably valid assumptions that you couldn't doubt it. That is the mark of the man.

Once cosmic-ray experiments no longer were the sole source of new unstable particles, he turned to the astronomy of cosmic rays. Where do they come from? There he carried me along; as a visitor to M.I.T. 17 years back, I worked with him closely for the first time and was infected with astronomy. The malady has never left me, nor him, nor M.I.T. physics.

Bruno Rossi is the very pattern of the good citizen, whether of M.I.T. or of the physics community or of our nation. He can be seen every day in a thoughtful and engaged mood, trying to direct us all on the paths of wisdom, compassion, and peace. We need him still, as we have for three decades.

**Philip Morrison**  
Professor of Physics



**Robert R. Shrock**  
Professor of Geology

As I reflect upon the many eventful years since I was an M.I.T. student in Course VI-A, I find it natural to think about those few special individuals—all encountered by good chance—who have had a profound influence upon the shaping of my own life in terms of really worthwhile objectives.

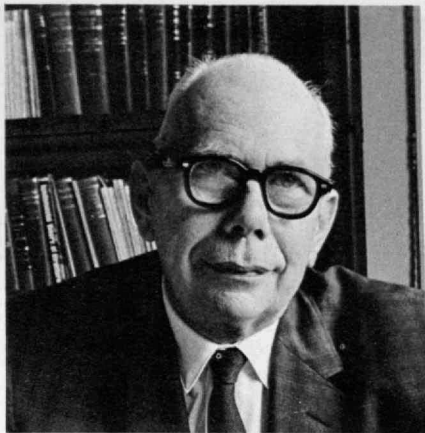
It became quite apparent through the years that success—and of course I mean in terms of personal happiness—is best obtained with the help of others. Robert R. Shrock is one of these few special individuals to whom I am grateful for his particular contribution of kindly influence and exemplary personal attributes.

By my good fortune, we first met in 1950—quite by chance at a convention of the American Association of Petroleum Geologists in St. Louis—and so was launched for me the idea that an industry-education relationship can be vitally important as an effective means of bringing great benefit, and without handicap, to both of these important elements in our society. Bob Shrock soon demonstrated that our promotion of his joint effort would naturally result in plenty of mutual satisfaction, as we were able to see both elements thrive in consequence of our common effort to help students find themselves in relation to their individual inclinations.

Bob easily rates as a great teacher—not only because he has a natural ability for communication but, even more importantly, because he is recognized by students, staff, and so-called professionals everywhere as a thoroughly rational, forthright gentleman with plenty of human understanding. He has been dedicated to his chosen science as a profession, and this is fully matched by his great interest in people—as exemplified by his unusual attention to the whole roster of individuals who graduated in the area of the earth sciences.

**Cecil H. Green, '23**  
Honorary Chairman  
Texas Instruments, Inc.





**John B. Wilbur, '26**  
Consulting Professor of Engineering

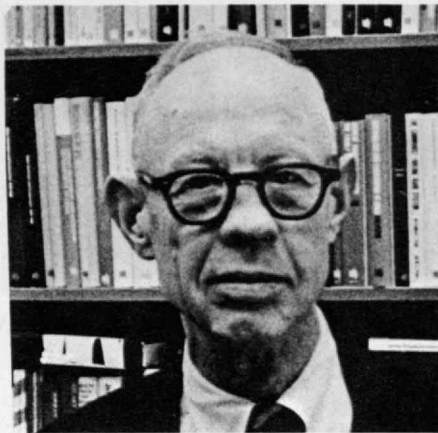
"Relevancy," "blending practice with theory," and "real-life design projects" are all popular words and phrases in engineering education today. But these ideas and many more like them were the hallmark of John B. Wilbur's teaching throughout his career at M.I.T., starting from the time he offered his first course in "Advanced Structural Design" as a brand new, young instructor in 1930. From their very first class, it was immediately apparent to his students that Bud had that extra-special natural talent that makes a person a great teacher.

Bud blended in with his academic career professional activities as an outstanding design engineer and engineering manager. His first major responsibilities continued over a period of years with Fay, Spofford and Thorndike, Consulting Engineers. Subsequently, he served as Chief Engineer for the large experimental wind turbine constructed on Grandpa's Knob, near Rutland, Vt. But his major professional responsibility was that of serving as Chief Engineer for the combination of consulting firms responsible for the first stage of the design of the Boston Central Artery.

Bud's creativity showed through in many of his activities, one of these being the creator of the lyrics and music for the now well-known M.I.T. song, "Sons of M.I.T." Most often, however, he applied his creativity to the academic endeavors which were his consuming interest. He created several new methods of analyzing structural models, a well recognized method for analyzing building frames for the effects of lateral loading, and, with Dr. Vannevar Bush's encouragement, a mechanical system for solving simultaneous equations.

Most of all, however, we are indebted to Bud for being the one who had the vision, courage, and determination to lead the revitalization of the civil engineering program at the Institute when he assumed the headship of the Department in 1946.

**Charles H. Norris, Sc.D. '42**  
Dean of Engineering  
University of Washington



**Francis E. Wylie**  
Director of Public Relations

When Jeff Wylie came to Boston in 1944 as Bureau Chief for Time and Life, the newsmagazine and photo journalism were fairly new. To parochial Boston, they were just a little more to be suspected than radio. In fact, it may have been a full year before some of his contemporaries looked at the masthead of Time to find out that his real name was Francis.

But freckle-faced Jeff just went about his business quietly, and before long city editors were asking some of their help, "How come we didn't have that piece about Curley that was in Life?" Or, "How is it that Time can get these birds to talk and we can't?" But all the time, he was a nice, friendly, unobtrusive guy—not at all like some of the self-important types that flourished on Boston papers in those days.

There was one time when Harvard and Radcliffe arranged a crew race, with the losers to peel off their shirts and give them to the winners, the way all-male crews did. The Boston press grudgingly was allowed to crowd on a single Metropolitan District Commission launch to watch the race. But just as the race was getting under way and the local press photographers were elbowing one another for space, along came another M.D.C. launch with the Time and Life correspondent and his photographer, with all of the aplomb of a million-dollar yacht ghosting majestically into Marblehead Harbor in Race Week. (By the way, Harvard graciously lost.)

When the brass at Time and Life decided to do some bureau shifting and some honcho in New York suggested sending Jeff Wylie to San Francisco, they failed to realize that old Jeff had been stricken with an old affliction. So Jeff crossed the Charles River. And it was the same old story. When things needed to be done, they were done. Editors never were bugged because some M.I.T. release was spiked. No reporter was ever told how to run his business or was sold herring for swordfish.

**John Fenton**  
Former Chief of the Boston Bureau  
The New York Times



**Jerrold R. Zacharias**  
Institute Professor; Professor of Physics

I count it among my important services to M.I.T. and to education that I shared in inviting Professor Zacharias—and several others who served in the Radiation Laboratory—to join the Institute faculty at the end of the war and then, subsequently, to have lent a hand to a number of notable enterprises which he initiated and led.

In 1956 I received from him a memorandum entitled "Movie Aids for Teaching Physics in High Schools." This classic document contained the basic ideas which were to lead to the Physical Science Study Committee (P.S.S.C.), out of which was to come a revolutionary physics course for high schools, and, in fact, a curriculum reform movement with worldwide impact in which first-rate scholars in our universities turned their creative attention to the development of better teaching in pre-college schools. The P.S.S.C. led later to the organization of Educational Services Incorporated, a nonprofit corporate entity devoted to curriculum reform and now continuing as the Education Development Center.

His earlier contributions to national security and to military technology, especially through his mastery of the "summer study" technique and his own important research with Professor Rabi and at M.I.T., were accomplishments enough for any one person, but in my judgment they are overshadowed by Professor Zacharias' contributions to the advancement of education.

For me Professor Zacharias has been at one time a goad, at another time a friendly, uninhibited, and often provocative counselor (we have often disagreed, but not on the great goals), at still another time a tireless companion-in-arms, fighting for educational causes. It continues to be a happy and stimulating privilege to be the colleague and friend of this memorably gifted scientist, teacher, and humanist who has so enriched and enlivened this fellowship of scholars, young and old.

**James R. Killian, Jr., '26**  
Chairman of the Corporation



A. T. Ippen



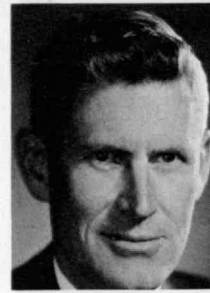
F. Modigliani



P. Elias



V. Barco-Vargas



W. S. Brewster



J. C. Haas

(Continued from page 86)

tor of Public Relations since 1955. Earlier he had been a member of the staff of the *Louisville Herald-Post* (1928-36) and of the *Louisville Courier-Journal* (1937-1944). He came to Boston in 1944 to serve as Chief of the Boston Bureau of *Time* and *Life* magazines. Born in Bloomfield, Ind., Mr. Wylie was graduated from Indiana University in 1928 and also attended DePauw University and the University of Grenoble (France).

Jerrold R. Zacharias, Institute Professor and Professor of Physics, has uniquely combined work on the frontiers of physics with active projects in scientific education. He came to M.I.T.'s Radiation Laboratory in 1940 following study at Columbia University (A.B., 1926, M.A., 1927, and Ph.D., 1932) and teaching experience at Hunter College. Later he was involved in atomic bomb development at the Los Alamos National Laboratory, but he returned to M.I.T. in 1946 to become Director of the Laboratory for Nuclear Science and Professor of Physics. Since then he has continued research on the radiofrequency spectra of atoms while participating in summer studies of defense applications of science, leading the development of a new high school curriculum in physics as Chairman of the Physical Science Study Committee, and directing M.I.T.'s own Education Research Center to devise new educational tools and methods for the Institute. Dr. Zacharias was a member of the President's Science Advisory Committee for a total of nine years between 1952 and 1964; he holds the Oersted Medal of the American Association of Physics Teachers and honorary degrees from Case Western Reserve, Jacksonville, Oklahoma City, St. Lawrence, and Tufts Universities.

### Institute Professors

Arthur T. Ippen, Ford Professor of Engineering who heads the Water Resources Division of the Department of Civil Engineering, and Franco Modigliani, Professor of Finance in the Sloan School of Management and Professor of Economics, have been named Institute Professors, the highest faculty honor at M.I.T.

The selection is based on nomination by members of the faculty reviewed by a committee of scholars, by the M.I.T. Academic Council, and by the M.I.T. Corporation.

Dr. Ippen, born in London, studied civil engineering in Germany and at the California Institute of Technology (Ph.D., 1936) before coming to M.I.T. in 1945. He has led the Institute's work in the field of hydrodynamics since then, and he is now Director of the Water Resources and Hydrodynamics Laboratory, to which a major addition has just been completed. He has made important research and teaching contributions to water resource engineering, and under his leadership the Hydrodynamics Laboratory has become a major national resource in this field.

Dr. Modigliani is known as an authority on monetary theory, capital markets, corporation finance, macroeconomics, and econometrics. He was born in Rome and holds degrees from the University of Rome and the New School for Social Research. Dr. Modigliani first came to M.I.T. in 1960 as Visiting Professor in the Sloan School, and he was appointed to the faculty as Professor in 1962; earlier he had served on the faculties of the New Jersey College for Women, Bard College of Columbia University, the University of Illinois, Carnegie Institute of Technology, Harvard, and Northwestern University.

### Green Professor

Peter Elias, '44, Professor of Electrical Engineering who was Head of the Department from 1960 to 1966, holds the Cecil H. Green Professorship in Electrical Engineering for two years beginning on July 1, 1970.

The Professorship, one of two announced earlier this year as the result of the gift of Mr. and Mrs. Cecil H. Green ('23) (see *Technology Review* for May, p. 103), was designated to help individual members of the electrical engineering faculty move into new areas of research, according to Raymond L. Bisplinghoff, Dean of the M.I.T. School of Engineering; accordingly, he said, the tenure of each Green Professor will be limited to a few years.

Professor Elias received his Ph.D. from Harvard in 1950, and he joined the M.I.T. faculty in electrical engineering in 1953; his M.I.T. degree is in the field of management. His past research has been concerned with coding of information sources and communication over noisy channels; as Green Professor Dr. Elias will explore the storage retrieval processing of information by computers and problems of communication within and between digital systems. His new work, says Professor Bisplinghoff, will be an important step in relating Professor Elias' experience in communications "to problems of importance to the data-processing field."

### Awards to Community Leaders, Including a Campus Patrolman

Sixteen awards to staff, students, and student organizations were made by President Howard W. Johnson at an awards luncheon, substituting for the traditional awards convocation, on May 21. Highlight of the ceremony was the presentation of the annual James N. Murphy Award to Captain James Olivieri of the Institute's Campus Patrol, who was cited for "spirited contributions to the Institute (which have) won a place in the hearts of students."

Seven Karl Taylor Compton Awards, named for the ninth President of M.I.T. to recognize "outstanding contributions in promoting high standards of achievement and good citizenship within the M.I.T. community," were made by Mrs. Karl T. Compton. The recipients were:

◇ Harold L. Federow, '70, Chairman of the Student Center Committee: "a generalist in all phases of student life, he directed the vast activities of the Student Center."

◇ Gary F. Gut, '70, Chairman of the Student Committee on Educational Policy: "catalytic in educational policy, he helped forge links for student-faculty cooperation in a wide range of Institute affairs."

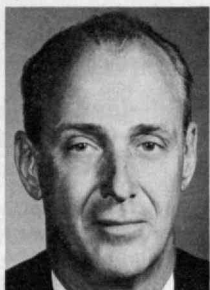
◇ Stephen H. Kaiser, '65, a graduate student who has been Editor of *The Catalyst*, graduate student newspaper: "an outspoken editor whose penetrating analyses untangled the complexities of the issues of the day."

◇ Marvin S. Keshner, '71, Vice-President





P. V. Keyser



P. H. Peters



Mrs. P. F. Wagley



D. R. Weedon

(1970-71) of the Undergraduate Association: "by providing a means for communication, he fostered understanding in a time of crisis."

♦ Karen H. Wattel, '70, Vice-President of the Undergraduate Association in 1969-70: "in a time of turbulent change, her persistent efforts contributed to the continued credibility of students and student organizations within M.I.T."

♦ *Thursday*, a weekly student newspaper: "a new voice in the journalistic arena that has fostered the spirit of creative reporting."

♦ Science Action Coordinating Committee: "a vanguard group during times of change and conflict."

William L. Stewart, Jr., Awards recognizing "outstanding extracurricular activity on the part of a student or organization" were also presented to five students and three organizations: Edward A. Fox, '71; Robert M. Frankston, '70; Alan M. Goldberg, '69, now a graduate student (his second award in two years); Luis M. Homez, '70; and Pamela Whitman, '70. Organizations receiving the award were Pi Tau Sigma, an honorary society for students in mechanical engineering, an ad hoc group of students who organized a multi media colloquium entitled "The Crab in Many Colors," and a second ad hoc student group responsible for operating an information clearing center during times of campus turmoil.

## Corporation Elections

Seven new members—all alumni, and including the first South American and the first woman ever to serve—have taken seats on the M.I.T. Corporation, the Institute's "board of trustees." The new members, announced by James R. Killian, Jr., '26, Chairman of the Corporation, on June 12, are:

♦ Virgilio Barco-Vargas, '43, Executive Director of the International Bank for Reconstruction and Development and former Mayor of Bogota, Colombia.

♦ William S. Brewster, '39, Chairman and Chief Executive Officer of USM Corp.

♦ John C. Haas, S.M.'42, Executive Vice-President and Vice-Chairman of the Board, Rohm and Haas Co.

♦ Paul V. Keyser, '29, President of the Alumni Association and former Executive Vice-President of Mobil Oil Co.

♦ Philip H. Peters, '37, Senior Vice-President of the John Hancock Life Insurance Co.

♦ D. Reid Weedon, '41, Senior Vice-President of Arthur D. Little, Inc.

♦ Mrs. Philip F. Wagley, '47, Headmistress of St. Paul's School for Girls, Baltimore.

Three of the seven new Corporation members—Messrs. Barco-Vargas, Peters, and Weedon—were chosen in

national balloting by members of the M.I.T. Alumni Association, and Mr. Keyser is ex-officio a member of the Corporation as President of the Association for 1970-71; all but Mr. Keyser have been named for five-year terms.

Mr. Barco-Vargas has lived in Washington since 1969, when he was named to his present posts with the International Bank, the International Finance Corp., and the International Development Association. Since graduating from M.I.T. in civil engineering, his career has involved government service in Colombia and public service as a member of the Colombian legislature.

Mr. Brewster, who studied mechanical engineering at M.I.T., joined the USM Corp. in 1946 following service in the Army Ordnance Department; he was the company's Vice-President from 1958 to 1961 and then was President for seven years before assuming his present post.

Mr. Haas joined the Rohm and Haas Co. in 1942, when he completed graduate study in chemical engineering at M.I.T.; his undergraduate degree is from Amherst College (1940). Following service with the U.S. Navy he returned to become Vice-Chairman of the Board of Rohm and Haas in 1959 and Executive Vice-President in 1962.

The Mobil Oil Co. claimed Mr. Keyser's services from the time of his graduation in chemical engineering from M.I.T. (S.B. '29, S.M. '30) until his retirement at the end of 1969. Among his positions during that 39-year period were Director of Research and Development Laboratories, Manager of the Lubricating Department, Marketing Manager, Domestic Vice-President, Director in Charge of Foreign Trade, Senior Vice-President—Planning, and Executive Vice-President—Chemicals. He was a member of Mobil's Board of Directors from 1955 to 1969.

Mr. Peters, President of the Alumni Association for 1969-70, joined John Hancock in 1940, was Director of Group Sales and Service for five years following



*The tests of campus policemen have been numerous—and sometimes extraordinarily demanding—during the 1969-70 academic year. So it was with special interest that the M.I.T. community watched President Howard W. Johnson make the coveted James N. Murphy Award this spring to Captain James Olivieri of the Campus Patrol.*



World War II service in the Navy, and became a Vice-President in 1950. He studied for both bachelor's and master's degrees in electrical engineering at M.I.T., and he has been an active leader in alumni affairs for many years.

Mrs. Wagley, whose husband is a Baltimore physician, graduated from M.I.T. in chemistry (as the former Mary Frances Penney) and received the doctorate in chemistry from Oxford University in 1950. She taught chemistry at Smith College and the Johns Hopkins School of Nursing before taking her present position in 1966.

A member of the Arthur D. Little, Inc., management since 1946, Mr. Weedon studied in M.I.T.'s general engineering course and served in the Navy during World War II; he was named A.D.L. Vice-President in 1954 and Senior Vice-President in 1962. Active in M.I.T. alumni affairs, he is also President of the Boston Museum of Science and Chairman of the Massachusetts Commission on Ocean Management.

### "In Ho-Jo We Trust"

"You get up in the morning and finally you go to bed" is what M.I.T. President Howard W. Johnson is said to have told John Davenport about how he organizes his time to conquer the daily press of appointments and work. Mr. Davenport himself, writing in the May, 1970, issue of *Fortune*, credits President Johnson's success to "two indispensable qualities: a buoyancy that can turn problems into opportunities, and a capacity to manage that Johnson defines as the 'art of studying the facts and then reaching a firm decision.'"

Mr. Davenport records another of President Johnson's responses: "The question is not what is easiest. The question is what is right."

Indeed, no professional public relations man could have written a much more understanding account of M.I.T.'s current dilemmas and the man who must chart the institution's course through them. It begins with Mr. Davenport's title, which is drawn from one candidate's poster in the 1970 M.I.T. student government election: "Come Squeeze or Bust, in Ho-Jo We Trust." It continues with Mr. Davenport's assessment of M.I.T.'s President: "... a well organized mind capable of economizing on energy and delegating authority ... the bounce and energy to stand up under what must inevitably be a

backbending load of work ... considerable administrative talent—a relaxed but stubborn style of getting things done."

But "what will make or break Howard Johnson," Mr. Davenport writes, is where he proposes to take M.I.T. in the 1970's and, specifically, what he proposes to do about its semi-independent laboratories. Mr. Davenport explores many aspects of that controversial decision on the laboratories (see *Technology Review for June*, pp. 80-82) which President Johnson announced just two weeks after the publication of *Fortune*; and one can wonder but never know—how one of M.I.T.'s friendliest critics may now think about the institution and its principal manager.—J. M.

### Isadore Amdur, 1910-1970

Isadore Amdur, Professor of Physical Chemistry, died on Wednesday, June 3, following an operation at the Deaconess Hospital, Boston; he was 60, and he had been at M.I.T. since 1932.

During most of his years at the Institute, Professor Amdur had been concerned with the study of the scattering of neutral atoms and molecules at high energies; he was internationally recognized for his contributions to the field of intermolecular forces, and his research has become the basis for all estimates and measurements of the physical properties of atoms and molecules at high temperatures. His book on *Chemical Kinetics* is widely known. Professor Amdur had also made significant contributions to the theory and experimental study of transport phenomena.

Howard W. Johnson, President of M.I.T., said Professor Amdur was "without peer in the training and inspiration of students of physical chemistry."

Professor Amdur studied at the University of Pittsburgh, and he had been at M.I.T. since receiving his Ph.D. there in 1932, except for two years on leave of absence status—one year as a Guggenheim Foundation Fellow at the University of California (Berkeley) and the California Institute of Technology, and one year as a Visiting Professor at the University of Kyoto, Japan, in 1965-66. He was helping to plan international conferences on the physics of electric and atomic collisions and on June 1, became a member of the Undergraduate Science Advisory Committee of the National Science Foundation.

The Isadore Amdur Memorial Fund has been established at M.I.T. to receive contributions from friends.

### Technical Training for the Disadvantaged

A new element has been added, beginning this term, to the ever-crowded M.I.T. corridors—a new group of 26 Institute employees who are receiving 10 hours per week of education and counseling for their first nine months of employment under a U.S. Department of Labor Technical Training Program for entering the disadvantaged into the job market.

While programs of this sort have been tried before in many organizations, including M.I.T., with varying success, to date the new M.I.T. Technical Training Program has a low (2 out of 26) attrition rate, "good" employee-supervisor, employee-counselor relationships, and from those close to it, a cautious bill of health.

The program has three parts: job training, education, and individual counseling.

On-site job training takes 30 hours a week, working—like other M.I.T. draftsmen, machinists, and electronic technicians—under an assigned supervisor at a particular job site. Within 30 days the trainee becomes a member of the Research, Development and Technical Employees Union. The M.I.T. department where he works pays half his wages; M.I.T. itself, to encourage the program, pays the balance.

For their educational activities (10 hours a week), trainees are grouped by ability into classes in mathematics, electronics, drafting, and machining. The courses are anything but run-of-the-mill; as one person said, they aim at "using the need to know to teach," for, in a job situation "with one simple task you are into chemistry in a minute."

The counseling phase of the Program means that two full-time counselors are available to work with the supervisors, trainees, and anyone else who ought to be, or is, involved. Together they run four "orientation" classes per week; topics include Lester Maddox, the draft lottery, alcohol and drugs, and You and Your Job. Counselor Greg Dunham explains: "Orientation means orientation to the world of work, which means everything that goes on. They will find that everything relates to the Institute, and to their jobs here."

Individual counseling also means meeting with the trainees on and off the job, home visits, and arranging meetings among supervisors to discuss common problems.

A unique aspect of M.I.T.'s program is that trainees are scattered at separate job sites. However, the classes, orientation, and counseling offices are all together, and the trainees are thus assured of ample chance to meet each other.

Reprints of John Davenport's *Fortune* (May, 1970) article, "Come Squeeze or Bust, in Ho-Jo We Trust," are available from the M.I.T. Alumni Fund. Send this form to Room E19-439, M.I.T., Cambridge, Mass. 02139

Name \_\_\_\_\_

Address \_\_\_\_\_  
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At least two distinctly different special opportunities for entering technical work are now active at M.I.T.—the Lowell Institute School (see right, and top and middle right photos) and a so-called MA-5 JOBS plan under a U.S. Manpower Administration grant. The MA-5 program, in which the U.S. Department of Labor and National Alliance of Businessmen are associated, provides funds for training and counseling new employees during a period of between 8 and 45 weeks while they are first employed. (Photos: Donald L. Estes, '71)

## An Ancestral Fund Goes Modern

"We have heard a great deal of late years about the captains of industry; but the efficiency of the industrial art depends, in a very large measure, and probably to an increasing extent, upon the capacity of its noncommissioned officers." This was the idea of Lawrence Lowell, the sole trustee of Boston's 60-year-old historic Lowell Fund, when he decided in 1903 to redirect the M.I.T. part of the Lowell Institute—then a loosely organized science education program—to become a "school for industrial foremen."

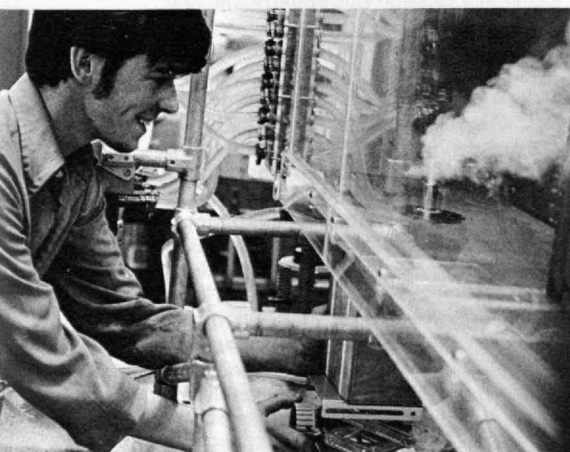
Mr. Lowell was talking about the needs of an earlier generation, and today the 130-year-old Lowell Institute is finding a more contemporary answer to the same mission. In the years since 1903, the school for industrial foremen has provided two-year programs in mechanical, electrical, and civil engineering—and some other courses in less comprehensive topics.

But beginning in 1968, the Lowell Institute School caught up with the computer age and its mushrooming demand for lower-level personnel with some experience in computer operations. Following the suggestion of an Assistant Professor of Electrical Engineering, John J. Donovan, the Lowell School advertised a computer course which attracted some 450 applicants and 360 flesh-and-blood students who appeared on Registration Day.

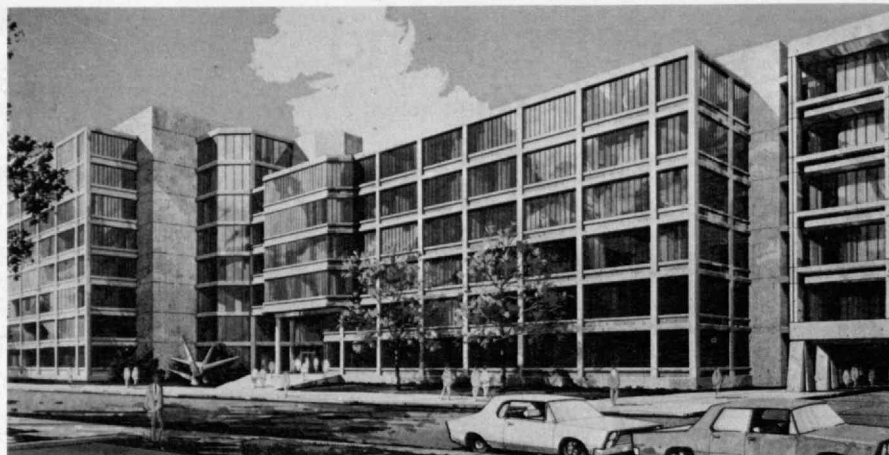
M.I.T. students and junior staff manned the courses, supervised by Professor Donovan (see *Technology Review* for July/August, 1969, p. 88). Indeed, the course had hit on a market which previous ones had not, and in the years since 1968 the Lowell Institute School has continued the same program on a more limited scale in order to permit greater attention to individual students. Meanwhile, it has dropped for lack of interest most of its more conventional activities.

In 1916, Lowell graduates were rehired as electrical engineers by the Edison Electric Illuminating Co. and the Lowell Electric Light Corp. at salary jumps of 250 to 300 per cent. Up until World War II, the Lowell School benefited M.I.T.'s senior faculty by offering extra income for their extra-hours teaching. (In the 1830's, John Lowell, Jr., founder of the Fund, stipulated that fees should "not exceed the value of two bushels of wheat.") However, the school now draws more heavily on instructors and assistant professors—and even M.I.T. students—who are attracted less by the income than by the contact with a different kind of student. In fact, during Professor Donovan's first course many of M.I.T.'s black students were teaching computer programming to the Lowell students, many of whom were black.

Presently, most Lowell pupils have high school degrees, a third or so are women, and the average age range is in the twenties, with a fair portion of middle-aged people. This year two first-year students are on full scholarship; the rest pay fees totaling \$50. The present format of a two-year program offers computer operations and programming in both years, with some mathematics, accounting, industrial management, and general science courses as well. In selecting applicants, states F. Leroy Foster, '25, Director of the Lowell Institute School, "priority will be given to those who are presently underemployed and to those who may have been denied employment opportunities but desire to become an active part of a new work force. The primary prerequisites of applicants . . . are a desire to learn and a willingness to work."







## Largest-Yet New Building

Plans are nearing completion for the new building to house parts of the M.I.T. Department of Electrical Engineering and Research Laboratory of Electronics, which is to be the largest single construction project on the campus since completion of the original "main" buildings in 1916. The cost is estimated at \$15 million, of which just over \$2 million remains to be obtained.

Building plans, drawn by Walter A. Netsch, Jr., '43, and his associates in the Chicago office of Skidmore, Owings & Merrill, call for a central core with east-west extensions paralleling Vassar Street on the site of the original Servomechanisms Laboratory, abutting the new Information Processing Center on the west and Building 24 on the south. The central core will provide a complex of class and seminar rooms which can serve as well as a conference center, and the wings will accommodate laboratories for "physics-oriented" and "health-oriented" activities of the Department. A special feature of the building will be its built-in electromagnetic shielding for many laboratory areas.

## Faculty Promotions

Promotions of 24 members of the M.I.T. faculty to the rank of professor and 56 members of the faculty to the rank of associate professor, effective July 1, have been announced by Jerome B. Wiesner, Provost of the Institute.

The promotions to professor are:

Wayne V. Andersen, Architecture  
Gordon L. Brownell, Ph.D.'50, Nuclear Engineering  
Hung Cheng, Mathematics  
Peter A. Diamond, Ph.D.'63, Economics  
John Dugundji, Sc.D.'51, Aeronautics and Astronautics  
Eugene Goodheart, Humanities  
Louis Kampf, Humanities  
Charles C. Ladd, '55, Civil Engineering  
A. Scheffer Lang, '49, Civil Engineering  
Earle L. Lomon, Ph.D.'54, Physics  
Sanford A. Miller, Nutrition and Food Science  
Henry A. Millon, Architecture  
John N. Newman, '56, Naval Architecture and Marine Engineering  
Krystyna Pomorska, Foreign Literatures and Linguistics  
S. Curtis Powell, '37, Naval Architecture and Marine Engineering

Edward B. Roberts, '57, Management  
Thomas B. Sheridan, Sc.D.'59, Mechanical Engineering  
W. Gilbert Strang, '55, Mathematics  
Peter Temin, Ph.D.'64, Economics  
Lester C. Thurow, Management  
Alar Toomre, '57, Mathematics  
Joseph Weizenbaum, Electrical Engineering  
Richard J. Wurtman, Nutrition and Food Science  
Laurence R. Young, '57, Aeronautics and Astronautics

The promotions to associate professor are:

Floyd O. Arntz, Ph.D.'65, Electrical Engineering  
William K. Bertram, Physics  
Sow-Hsin Chen, Nuclear Engineering  
John T. Christian, '57, Civil Engineering  
Ernest G. Cravalho, Mechanical Engineering  
Richard L. de Neufville, '60, Civil Engineering  
John J. Donovan, Electrical Engineering  
James W. Dubrin, Chemistry  
Arthur Evans, Jr., '54, Electrical Engineering  
Roy E. Feldman, Political Science  
Jean-Pierre Flatt, Nutrition and Food Science  
Jay R. Galbraith, Management  
Merrill F. Garrett, Psychology  
Leon R. Glicksman, '59, Mechanical Engineering  
George A. Gorry, Jr., Ph.D.'67, Management  
Thomas J. Greytak, '62, Physics  
Leon B. Groisser, '48, Architecture  
James W. Harris, Ph.D.'67, Foreign Literatures and Linguistics  
John R. Harris, Economics  
John B. Heywood, Ph.D.'65, Mechanical Engineering  
Michael Y. Jaffrin, Mechanical Engineering  
Cecil E. Jones, Physics  
Norman Jones, Naval Architecture and Marine Engineering  
David A. Kolb, Management  
Robert J. Kolenkow, '55, Physics  
Theodore P. Labuza, '62, Nutrition and Food Science  
Mark A. Levensky, Humanities  
Jerome H. Milgram, '61, Naval Architecture and Marine Engineering  
Donald E. Nelsen, '61, Electrical Engineering  
David N. Ness, '61, Management  
Steven A. Orszag, '62, Mathematics  
Michael J. Piore, Economics  
William L. Porter, Urban Studies and Planning  
Kenneth F. Reinschmidt, '60, Civil Engineering  
James K. Roberge, '60, Electrical Engineering  
John F. Rockart, Ph.D.'68, Management  
Daniel Roos, '61, Civil Engineering  
John R. Ross, Foreign Literatures and Linguistics  
Jerome H. Saltzer, '61, Electrical Engineering  
Harvey M. Sapolsky, Political Science  
John C. Schaake, Jr., Civil Engineering  
Gerald E. Schneider, Ph.D.'66, Psychology  
Stephen D. Senturia, Ph.D.'66, Electrical Engineering  
Arthur Steinberg, Humanities  
Jeffrey I. Steinfeld, '62, Chemistry  
Lisa A. Steiner, Biology  
Walter D. Syniuta, Sc.D.'67, Mechanical Engineering  
Vigdor L. Teplitz, '58, Physics  
Glen L. Urban, Management  
Vytenis M. Vasyliunas, Ph.D.'66, Physics  
Daniel I. C. Wang, '59, Nutrition and Food Science  
Sheila E. Widnall, '60, Aeronautics and Astronautics

*Though it will be the largest single construction project since completion of the Institute's original buildings in 1916, the new M.I.T. electrical engineering building will house but one-third of the Department of Electrical Engineering and half of the Research Laboratory of Electronics. Electromagnetic isolation is to be a feature of many parts of the building, and the use of office space to isolate noise-producing areas has led Professor Henry J. Zimmermann, Director of R.L.E., to note that "I've been asked to do some pretty odd-ball things in my life, but I've never before been asked to serve as an r-f shield!"*

David N. Wormley, '62, Mechanical Engineering  
Gerald L. Wilson, '61, Electrical Engineering  
Carl I. Wunsch, '62, Earth and Planetary Sciences  
Vernon R. Young, Nutrition and Food Science

## Honoring "Mr. M.I.T." in Chicago

Nearly 100 leading M.I.T. alumni in the Greater Chicago area joined on June 9 to honor James M. Barker, '07, as "Mr. M.I.T. of Chicago" at the annual dinner meeting of the M.I.T. Club of Chicago in the Drake Hotel.

James R. Killian, Jr., '26, Chairman of the Corporation, said that Mr. Barker, "throughout his professional career, has invested his work—whether it was teaching, finance, or management, with a humane spirit. . . . I speak of his powerful administrative intelligence, his extraordinary range of interests and learning, his mastery of language and the arts of communication, and his 'perceptive literary taste.'" Dr. Killian said.

"In saluting and honoring Jim Barker this evening," said Dr. Killian, "we reaffirm some values that are too often neglected in these disheveled times. We honor an independence of mind which tolerates that independence in others. We honor his quality of being rigorously rational without diminishing his warm humanity, his thoughtful courtesy, and his love for friends with all their frailties. We admire that sense of perspective that gives him a balanced view of our present discontents, a view that recognizes faults in our society, the concern of youth, and the need for change without losing any pride in our country."

Mr. Barker, who is 84, studied engineering at M.I.T. and entered the management of Sears Roebuck and Co. after an 18-year career in engineering and a number of years with the First National Bank of Boston. He first became a member of the M.I.T. Corporation in 1934 and became a Life Member in 1940. Most recently his name has been associated with the new engineering library at M.I.T. dedicated early this spring (see Technology Review for May, pp. 100-101).





When he first joined the Aluminum Company of America at its Niagara Falls plant, Irving W. Wilson, '11, is supposed to have written, "I figured I had missed the boat. I wanted to be with a growing concern, and I was only sorry I hadn't been able to join ALCOA at its greatest era of expansion." That was 60 years ago—a story recounted by James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, when the M.I.T. Club of Western Pennsylvania honored Mr. Wilson this spring as an "outstanding contributor to the direction and resources of M.I.T." In the picture are (left to right) Dr. Killian, Mr. Wilson, Edward J. Hanley, '24, Chairman of the Board of Allegheny Ludlum Steel Corp., and Albert A. Ward, Jr., '54, President of the Club.

## Harold B. Richmond, 1892-1970

Harold B. Richmond, '14, a long-time leader in M.I.T. alumni affairs—including those of *Technology Review*—and a Life Member of the M.I.T. Corporation since 1952, died on May 7; he was 78. He had been Chairman of the Board of General Radio Co. from 1944 to 1957 and since then had been Honorary Chairman.

Mr. Richmond, the 45th President of the Alumni Association in 1938-39, became an Alumni Term Member of the Corporation in 1933, when he was one of the youngest alumni ever so elected, and continued through re-election until 1944. Meanwhile, he served for many years as Secretary of the Class of 1914 and in other assignments for the Alumni Association; Mr. Richmond was the first Chairman of the Alumni Fund Board from 1940 to 1945.

In his announcement to the M.I.T. community, James R. Killian, Jr., '26, Chairman of the Corporation, said Mr. Richmond was "a dedicated alumnus, extremely active in the Institute and its alumni affairs, . . . a participant and valued counsellor in many of the Institute's capital funding undertakings."

Mr. Richmond graduated from M.I.T. in electrical engineering, worked in public utilities for two years and on the M.I.T. teaching staff for one year before entering the Coast Artillery for World War I service, and joined General Radio Co. as a development engineer in 1919. He was made Secretary of the Company two years later and became Treasurer in 1926.

During World War II Mr. Richmond was Chief of the Guided Missiles Division of the National Defense Research Committee, and he was awarded the Presidential Medal of Merit for his contributions from 1942 to 1945. Since then he had served as Trustee of both Northeastern and Norwich Universities (he was awarded the honorary Doctor of Engineering degree from Norwich in 1948) and as a Director of the Liberty Mutual Insurance Co. Mr. Richmond was a Past President of the Radio Manufacturers Association and of the Scientific Apparatus Makers of America.

## Hail to the Chief!

More than 200 members of the M.I.T. Club of Western Pennsylvania paid tribute to Irving W. Wilson, '11, Director and former Chairman of the Aluminum Company of America, at the Pittsburgh Hilton Hotel on May 6. James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation who was the principal speaker of the evening, said "Chief" Wilson "is the kind of man M.I.T. is proud to have had a share in educating.

"And it has been our institution's great good fortune," Dr. Killian continued, "that as alumnus and trustee 'Chief' Wilson has devoted his talents to M.I.T.'s advancement. . . . He has made M.I.T. the beneficiary of . . . his powerful administrative intelligence, his mastery of detail, his largeness of spirit, his considerate courtesy, his rare gift for leading men and for commanding their loyalty and affection."

Edward J. Hanley, '24, Chairman of the Board of Allegheny Ludlum Steel Corp., presided at the dinner, and gifts in honor of Mr. Wilson to fund scholarships in the field of management were presented to Dr. Killian by Albert A. Ward, Jr., '54, President of the Pittsburgh M.I.T. club.

## George W. Morse, 1883-1970

Dr. George W. Morse, who was M.I.T.'s first Medical Director and held that post for 27 years beginning in 1920, died on May 26 at his home following a long illness. He was 87.

Dr. Morse first became associated with the Institute when the Cambridge Campus was under construction; when he became Medical Director in 1920 the medical facility, then known as the Department of Hygiene, was little more than a first-aid station visited by fewer than 200 members of the Institute community every year. Under Dr. Morse the Medical Department developed comprehensive care plans, including the Homberg Infirmary, and by the time of his retirement in 1947 use of the medical facilities had grown to over 25,000 visits a year.

Dr. Morse studied at Harvard (A.B., 1905, M.D., 1908), served at Massachusetts

General Hospital (where he became the first resident surgeon), and was for many years head of the Brooks Hospital (now part of the Lahey Clinic) and medical director of the Liberty Mutual Insurance Co. in addition to his M.I.T. duties.

## Geology Alumni

"You have been superb!" says Robert R. Shrock, Professor of Geology, to alumni of the Department of Earth and Planetary Sciences, in his forward to the 1970 *Register of the Department* published in June: more than 90 per cent of the Department's graduates completed Professor Shrock's questionnaire for the new volume, and many provided data on fellow alumni as well.

The 74-page book is almost exclusively the work of Professor Shrock and his long-time secretary, Pauline Richmond. It lists current data on 716 M.I.T. alumni—659 from what began as the Department of Geology and is now the Department of Earth and Planetary Sciences (Course XII, in M.I.T. language) and 57 from the "geology option" of the Course in Mining Engineering and Metallurgy given from 1905 to 1922. In all, Course XII has awarded 813 degrees since 1890—359 bachelor's degrees, 212 master's degrees, and 242 doctorates.

Among the alumni both usual and unusual vocations are listed: a paleobotanist who studied botany (Ph.D.) following his undergraduate work in geology and geophysics; N.A.S.A.'s Curator of Lunar Material; a photogrammetric engineer currently involved in the science portion of planning for a Mariner mission to Mercury via Venus in 1973; an economist for the U.S. Bureau of Commercial Fisheries; the Surface Scientific Coordinator for TEKTITE I; the head of the Bioengineering Division of Peter Bent Brigham Hospital, Boston; the Rector of the Technical University of Istanbul, Turkey; and an exploration geologist who is "just trying to bring into production another low-grade copper ore body—100 million tons or so."

In addition to alumni data, there are faculty biographies, a summary of recent events and current research interests, and a list of the Department's principal



*It took four guns from the east to settle the west. The four guns are M.I.T.'s newly crowned National Collegiate International Target Champions (left to right) Captain O. David Asbell, Jr., '70, Daniel H. Flint, '70, John F. Good, '72, and Alan Smith, '71; with them is coach Thomas P. McLennan, Range Officer for the M.I.T. Athletic Department. The foursome totaled 1,004 points to outdistance their nearest rival, South Missouri State (996), among 25 universities and colleges competing in six sectional meets across the country. It is M.I.T.'s first National Pistol Championship ever and the first U.S. collegiate crown here since the sailing team's victory in 1961.*

benefactions. Special credit is given to Thomas C. Desmond, '09, former New York State Senator, whose contribution to the Department has made possible the 1970 *Register*. Copies of the book are available on request from Professor Shrock.

### **The Clean Air Car Race: Beware the Transcontinental Traffic Jam**

"About the only thing we haven't heard from is a car powered by a rubber band," says Robert C. McGregor, '69, the M.I.T. graduate student who is Chairman of the Clean Air Car Race Organization Committee. Indeed, the traffic on the route between Cambridge, Mass., and Pasadena, Calif., at the end of August may be so heavy that tourists should seek alternative routes: 58 low-pollution vehicles representing student groups at 44 schools and colleges had been entered by June 1, and Mr. McGregor was expecting up to 70 entries by the July 15 deadline.

"Boy, have we been surprised!" says Craig Lentz, a graduate student in management who is Vice-Chairman of the Committee. He thinks "there are probably more than 1,000 students spending this summer building, testing, and perfecting vehicles they think can help reduce air pollution." In general, all vehicles qualifying for the race, organized primarily by M.I.T. and California Institute of Technology students, must meet or better 1975 federal pollution standards.

The entries thus far received include electric automobiles, electric-gasoline hybrids, steam cars, turbine-powered vehicles, and cars with conventional internal-combustion engines arranged to use such low-pollution fuels as propane and natural gas.

There are currently four M.I.T. entries. One group, co-directed by students William W. Carson, '69, and David A. Saar, '70, is building an electric vehicle with a battery pack which will be replenished intermittently by a generator-rectifier unit driven by a two-cylinder gasoline engine (see *Technology Review* for May, pp. 96-97). Their faculty advisor is Richard D. Thornton, Sc.D.'57, Professor of Electrical Engineering. Michael L. Bennett,

'70, heads a second M.I.T. group building an electric vehicle with a prodigious 500-h.p. motor that will draw d-c power from a turbine-driven generator-rectifier system. Their adviser is Professor Emeritus Charles Stark Draper, '26, President of the Laboratory that bears his name. The two newest M.I.T. entries are steam-powered vehicles being built by students in nuclear and mechanical engineering; details were not available at press time.

Caltech students are converting a standard automobile to burn compressed natural gas in its six-cylinder engine. In addition, they also plan to enter a second compressed-gas car built by a California utility company.

Wally E. Rippel, whose Caltech car defeated M.I.T. in the first transcontinental electric car race two years ago, is also in this year's race. He is now a graduate student at Cornell University, and his 1970 entry is a battery-powered vehicle sponsored by Electric Fuel Propulsion, Inc.; it is one of two from the Cornell Electric Car Project.

Entries have been received from three different sources at Northeastern University in Boston. Professor A. R. Foster filed entry papers for a Boston Gas Co. car fueled by liquid natural gas. A second Northeastern entry is for a steam-propane system and the third is for an internal-combustion car that burns lead-free gasoline.

A group in the Cockburn Unit in Engineering Design at the University of Toronto, Canada, is building a propane-electric hybrid unique in that it will work in any one of three optional modes: all propane-fuel for an internal-combustion engine; a propane-fueled engine running at constant speed to charge batteries; or fully electric.

A hybrid electric car that uses a gas turbine to drive its generator has been entered by a group at the University of New Hampshire. Newark College of Engineering students at Newark, N.J., also have registered an electric hybrid which will use an unleaded gasoline engine to generate electric power stored in a bank of nickel-cadmium batteries.

At Buffalo State College, Buffalo, N.Y., students are revamping a sports car to run on liquid propane. Liquid-propane cars also have been entered by students from Southern Methodist University's Institute of Technology in Dallas, Tex.; Tufts University; the University of South Florida, Tampa, Fla.; the University of Wisconsin; St. Clair College, Windsor, Ontario, Canada; Stanford University; Northwestern University; Villanova University; the University of Evansville; and San Jose State College, San Jose, Calif. Two LPG entries have been received from Whitworth College, Spokane, Wash.

University of Arizona students are converting a new 1970-model automobile furnished by a local dealer to burn natural gas.

Meanwhile, students at San Diego State College, La Jolla, Calif., have stated their intention to enter a liquid-natural-gas car built and owned by the San Diego Gas and Electric Co. Other LNG entries have been filed by students at Lowell Institute of Technology and at Illinois Institute of Technology.

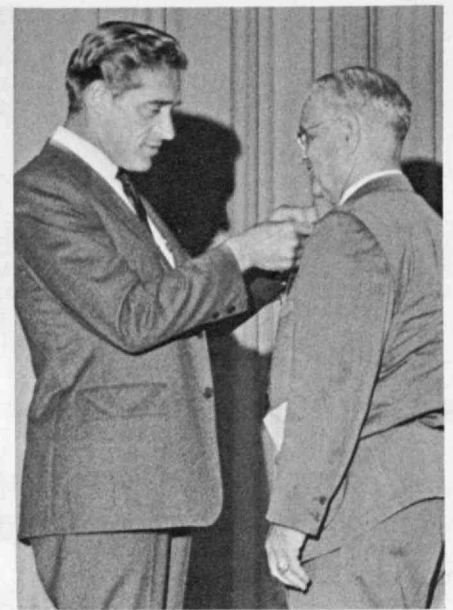
Other electric entries have been received from Georgia Institute of Technology; Oakland University, Ferndale, Mich.; Southeastern Massachusetts University, North Dartmouth, Mass.; Iona College, New Rochelle, N. Y., (Chg-A-Matic Corp., sponsor); the University of Detroit; Cerritos College, Nowalk, Calif.; Boston University (Anderson Power Products, Inc., sponsor); and Orange Coast College, Costa Mesa, Calif.

University of Nevada students are entering a steam car which uses fuel oil as energy source, and a combination steam-internal combustion car called "Air-quarius" will come from the University of Colorado.

Entries for internal-combustion engines specifying unleaded fuels or specifying no definite fuel also have been received from a group at the University of California at Irvine (sponsor, Critter, Inc.), the University of California at Berkeley, Louisiana State University, and the University of Michigan. Still another internal-combustion entry, to be fueled by liquid



John S. Foster, Director of Defense Research and Engineering (left), honored C. Stark Draper, '26—and with him the Draper Laboratory and M.I.T.—when he came to Cambridge on June 16 to present to Professor Draper the Department of Defense Distinguished Public Service Medal.



hydrogen and liquid oxygen, has been received from the Perris Smogless Automobile Association of Perris, Calif., representing a student group at Mount San Jacinto College in Perris.

The early entries also included two from high schools which the C.A.C.R. Committee is disposed to accept despite the fact that the race was to have been limited to college and university groups. One is from Mendel Catholic High School in Chicago, where students are working on an internal combustion engine that will burn unleaded gasoline; the other, entered by the Corken Pump Co. of Oklahoma City, Okla., on behalf of the Putnam City West High School, is for an internal-combustion-engine car burning propane or compressed natural gas.

Four separate groups at Worcester Polytechnic Institute at Worcester, Mass., are preparing vehicles for the competition. One—the W.P.I. "Ohms-mobile"—is an electric-gasoline hybrid; the W.P.I. "Propane Gasser" is a conventional engine fueled by propane instead of gasoline; a third, a Saab of America entry, is a turbine car with fuel injection; the final car is "The Great Teakettle," a closed-cycle Rankine steam car.

#### Symposia and Racing

The race itself will begin in Cambridge on August 24, with all vehicles following a 3,600-mile highway route through Massachusetts, New York, Ontario, Michigan, Indiana, Illinois, Missouri, Oklahoma, Texas, New Mexico, Arizona, and California—ending on the Caltech campus in Pasadena.

During the week preceding the race, all entries will be subjected to vehicle performance and pollution emission tests in Cambridge, the results of which will constitute a major factor in determining final standings. And during that week in Cambridge, the C.A.C.R. Committee will sponsor technical meetings and symposia where competitors will describe the technical aspects of their vehicles.

Race rules permit student groups to solicit and receive all the help they can muster from industry, business, or other groups outside their universities. In some cases, entrants are constructing vehicles

on their own using parts and money supplied by outside backers. Other groups will be driving experimental vehicles built by industrial firms; the requirement in these cases is that the student group must be able to make all roadside repairs.

The General Motors Corp. is making available to the C.A.C.R. Committee for distribution to race entrants 20 Chevrolet Chevelle automobiles plus capital of \$2,000 per automobile. Groups receiving the G.M. vehicle grants will be permitted to rebuild or modify the cars according to their own plans.

#### For "Real-World Guidance"

The Distinguished Public Service Medal of the Department of Defense was awarded to C. Stark Draper, '26, President of the Draper Laboratory, by John S. Foster, Director of Defense Research and Engineering, in ceremonies at M.I.T. on June 16.

The citation, signed by Melvin R. Laird, Secretary of Defense, said Dr. Draper was "the prime innovator and achiever in the realm of inertial guidance and navigation and fire control systems. . . . Under his enlightened and stimulating leadership, the Instrumentation Laboratory (now known as the Draper Laboratory) fostered scientific and engineering advances that have enabled the military services of the United States to reach the highest levels of effectiveness in the areas of his special genius."

Dr. Foster, praising Dr. Draper for his vision, judgment, and inspiration—and for the environment of creative research and teaching which he has fostered in the Draper Laboratory—spoke of Dr. Draper's leadership: "Once 'Doc' has started on a course, everyone gets his real-world guidance signals, and more than once they have kept us on the right course." Today, he said, "our strategic systems depend on the technical foundation laid down in this area of technology at this institution."

Howard W. Johnson, President of M.I.T., introduced the ceremonies by calling Dr. Draper "one of the great men of M.I.T. and of American engineering."

#### Urban Studies and Planning

Lloyd Rodwin, Professor of Land Economics in the M.I.T. Department of Urban Studies and Planning, has succeeded John T. Howard, '35, Professor of City Planning, as Head of the Department. After more than 12 years in that post, Professor Howard will return to teaching, research, and consulting work, according to Lawrence B. Anderson, Dean of the School of Architecture and Planning, who announced the new appointment.

Professor Rodwin is widely known in the planning profession, having served as an adviser on housing, urban planning, and regional development problems to the United Nations, the Inter-American Housing Center, the Organization for Economic Cooperation and Development, the International Bank, the Department of Housing and Urban Development, and many other groups. His most recent book, *Nations and Cities: A Comparison of Strategies for Urban Growth*, deals comprehensively with the nation's planning problems: specifically, how backward areas can be transformed while at the same time making cities better places in which to live.

Professor Rodwin came to M.I.T. as a research associate in 1946, following work at the College of the City of New York (B.S.S.'39), the New School for Social Research, the University of Wisconsin (M.A.'45), and Harvard University (M.P.A.'46, Ph.D.'49). He joined the faculty in 1947 as Assistant Professor of City Planning and became Professor of Land Economics in 1959.

Professor Howard has been a planning consultant to nearly a dozen major cities and many smaller ones; he is considered one of the nation's leading urban planners. He came to M.I.T. in 1949 after a career in city and regional planning for the Cleveland area; he holds the distinguished Service Award of the American Institute of Planners (1963), of which he is a past President.





## Commencement: Silent Minutes For the "Unity of Man"

College commencements were different in 1970, and M.I.T.'s was no exception—more solemn, less resplendent. There were no disruptions, and none was threatened; it was simply that, as Steven C. Carhart, President of the Class of 1970, said at the Commencement Luncheon, "we cannot be optimistic and happy today; we enter next year with a sense of concern and even foreboding."

Accordingly, there was no Commencement address, President Howard W. Johnson having spoken to the Class of 1970 and their parents the evening before (see pp. 70-71); instead, a representative of the Class of 1970 read the following statement during the Graduation Exercises:

"This Commencement comes amid a sense of crisis. We feel we must depart from the normal graduation ceremony this year. Instead of receiving the customary Commencement charge, we ask that everyone present join in two minutes' silent consideration of what he can do to help resolve the conflicts which divide mankind in this country and around the world."

More degrees—a total of 1,422 to 1,239 students—were awarded by M.I.T. in June, 1970, than in June of any previous year. But fewer than usual of the candidates came to receive their degrees at the Graduation Exercises—less than 60 per cent this year, compared with about 70 per cent in "normal" years. (Classes for the rest of the term at M.I.T. had been made "optional" by the faculty on May 5—see Technology Review for May, p. 82—and many students having completed their formal assignments left the campus early.)

Four graduates chose to indicate their concern for world affairs by omitting academic robes and donating rental fees to the cause of peace; a greater number chose not to wear the traditional academic caps; and many—perhaps half—wore white armbands bearing the peace symbol. As usual, the degrees were awarded by President Johnson and the deans of the academic schools, and James R. Killian, Jr., '26, Chairman of the Corporation, presided.

### Discussion and Pomp

The officers of the Class of 1970 arranged special events for the day before Commencement, designed to reflect to their parents their concern with world and national affairs. Richard Goodwin, a former staff member for John and later Robert Kennedy, delivered a major address (see pp. 70-71), and workshops were scheduled on topics ranging from campus political action to North Vietnam and the role of the S.D.S. But, perhaps because these issues had been discussed so thoroughly during the year, only a few of the 15 planned workshops materialized into full-fledged discussion groups.

But no changes altered the pomp of the academic procession to the Graduation Exercises in Rockwell Cage, or the effect of the brass choir led by John D. Corley, Assistant Director of Music, M.I.T., or the size of the audience, or the traditional grins and prattle which accompany the awarding of degrees. One wife of a Ph.D. candidate ran up to him while he was only a few steps away from the President for last-minute instructions on how to work her camera. An overjoyed toddler, unable to contain himself, ran forward to greet another Ph.D. as he marched from the platform with his degree. A long-haired undergraduate was persuaded only at the last minute not to wear a cowbell attached to his costume when he went up to receive his degree. One of the microphones faltered, and there was general applause when it was returned to action.

Commencement 1970 was marked by an academic innovation: the award of M.I.T.'s share of the first Ph.D. degree in oceanography jointly given by the Institute and the Woods Hole Oceanographic Institution. Paul M. Fye, President of W.H.O.I., was on hand to award the degree with President Johnson.

Among the 52 mid-career executives receiving Master of Science degrees following their year as Sloan Fellows were also several "firsts:" two graduates from the Soviet Union, the first manager of an elementary school system (the Director of Special Projects for the Highland Park, Mich. Board of Education), the first representative of urban management (the Deputy Comptroller of Atlanta, Georgia), and the first journalist (the Industrial Editor of the *Times* of London).

### Responsibility and Responsiveness

The Class of 1970 leaves M.I.T. with a sense of "concern and even foreboding," said Steven C. Carhart, President of the Class, at the annual Commencement Luncheon, because the nation and its people have lost sight and control of their destiny.

"Somehow," he said, "our policies and institutions have acquired a life of their own, independent of those who move and work in them." What he and his classmates seek is a rebirth of responsibility and responsiveness. "The spirit of personal responsibility must be an increasingly important part of our culture—responsibility for the consequences of what you do," he said.

Speaking to the 50-year Class of 1920, Mr. Carhart noted that two experiences have shaped the lives of their generation—war and depression. "You could believe in those wars," he said, but we cannot believe in Vietnam. And the depression yielded for you an emphasis on material welfare which "those of us now growing up simply don't feel."

If there is a generation gap it is born of

*Though the mood may have been less buoyant, the familiar scenes were repeated at M.I.T.'s 1970 Commencement: One lucky couple bespoke the President's talents as photographer (left); Paul V. Keyser, Jr., '29, smiled in embarrassed pride as his hood was arranged for his first public appearance as President-Elect of the M.I.T. Alumni Association; as many as half of the graduates may have worn the blue and white "peace" armbands; and less than 50 feet separated 50 years as Edwin S. Burdell, '20, spoke for his classmates at the Commencement Luncheon (bottom) while Steven C. Carhart, President of the Class of 1970, listened.*

these two things. But it need not persist. We must get over "the instant gratification syndrome," regain control and responsibility for our course, and work together once more. Given these conditions, said Mr. Carhart, "if this country cannot make itself into an example of what society should be, then none can."

### From Success—Failure?

The Class of 1920, having participated in "one of the most exciting half-centuries in human history," now knows that the result of man's material progress can be "a new flowering of the human spirit." But its realization remains to the new generation—the Class of 1970, said Edwin S. Burdell, '20, speaking for his 50-year class at the Commencement Luncheon on June 12.

We have failed to meet the challenge of the forces we have created, he told his classmates. Pollution, traffic congestion, and deprivation remain despite the affluence of our society; we have created and failed to curb many acute dislocations.

But the new generation has a broader education than ours. It is their task and opportunity to "see the light of a new professional ethic dedicated to social progress, to harness the forces of technology in pursuit of the good life."

### R.O.T.C.: "The Issues Are the Evil"

"Unrest is not the evil—the issues are the evil. And most of the issues, as multi-faceted as they may be, are reasonable and deserve attention and correction. I am speaking not only of the campus: disappointing learning opportunities, arbitrary nonparticipative rules of governance, and inadequate communications between students, faculty, and administrations. I refer to the divisive issues in our society . . . the issues of international peace, environmental pollution, urban renewal, and racial discrimination."

The speaker was not some student explaining his cause, but Lt. Gen. Albert P. Clark, Commander of the Air University at Maxwell Air Force Base, Ala., speak-





In addition to the traditional Graduation Exercises on Friday morning, June 12, Commencement included reunions of students and parents, last conversations with members of the faculty, and a chance to meet the President after Howard W. Johnson's address to the graduates and their guests on Thursday evening, June 11 (see pages 70-71).



ing at ceremonies for 35 M.I.T. graduates who received Army, Navy, or Air Force commissions this June.

In a solemn ceremony in Kresge Auditorium the day before Commencement, four students were commissioned as Army Second Lieutenants, ten were commissioned as Army Reserve Second Lieutenants, seven were commissioned as Ensigns in the Naval Reserve and 14 were commissioned as Second Lieutenants in the Air Force Reserve.

General Clark said he admired these graduates for their "scholarly achievement, a high sense of values" and "an enthusiastic, healthy attitude toward the future." He told them that the years they had just spent in college, suffering the "heckling and abuse" of the "misguided activist fringe on the campus," would be the most "frustrating" years they would have—even if their military service proved "dangerous."

He warned them not to underrate their influence. "There are only a handful of institutions seeking to terminate their R.O.T.C. association and there are a hundred seeking to join. Look proud and carry your banners high. . . . The profession of arms is an essential social institution offering an orderly way of life, set a little apart, not without elegance. . . . It gives more and it takes more, enriching freely anyone prepared to give more than he gets. It will remain with us for as long as man continues to be what he is, too clever and not good enough."

### **Alumni Homecoming: Bright Weather, Pops, and Pollution**

It was a memorable weekend. The weather for reunions throughout New England was the kind to remember—the clear, cool kind that New England only seldom has. The crowds were large—3,600 registrants for Alumni Homecoming on June 14 and 15, surpassing by far the 2,600 record from 1966. And who could be unfulfilled by Arthur Fiedler and his Boston Pops Orchestra?

In addition to the Boston Pops on Sunday evening, the Alumni Homecoming program had a little of everything for everybody. Events began on Sunday afternoon with a recital by the M.I.T. chamber singers, Klaus Liepmann, Professor of Music, conducting, with pianists John Buttrick and Robert Freeman, both Assistant Professors of Music; Antonia Lavanne, soprano; Robert Levin, piano; and Gregory Tucker, piano, and Constance Boykan, flute.

By Monday morning alumni who were ready for more serious fare could choose between exhibits of art and architecture and seminars on current issues. For example, Frank Press, Head of the Department of Earth and Planetary Sciences: "We have learned more about the earth by going to the moon than we have by any experiment performed on



earth." And Lincoln P. Bloomfield, Professor of Political Science: "The world has stopped being bipolar in every way except in its capacity to destroy."

James A. Fay, S.M.'47, Professor of Mechanical Engineering, began his discussion by suggesting that the maintenance of high environmental quality is probably incompatible with continued growth of material consumption. The only question, he said, is when the consequences will outrun the benefits.

But some forms of pollution may in fact yield to technology. If present small-scale experiments lead to a good method for removing sulfur from power plant effluents, such emissions may in fact be controlled by 1995. The alternative to treating polluters one by one, he said, is massive research on improving the quality of fuel and on the technology of its combustion; and this is not happening.

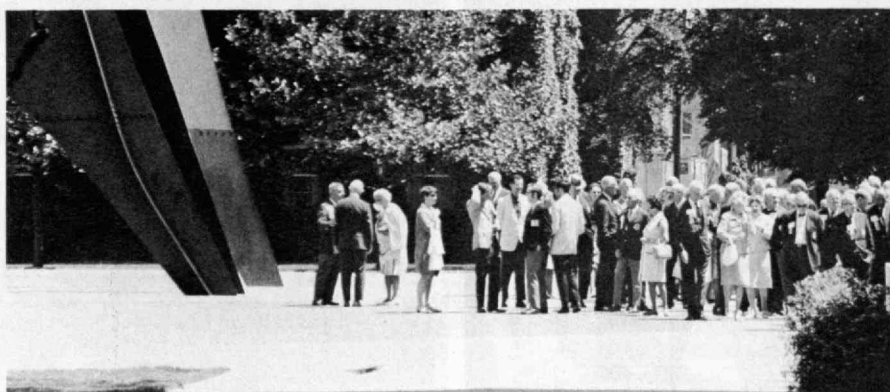
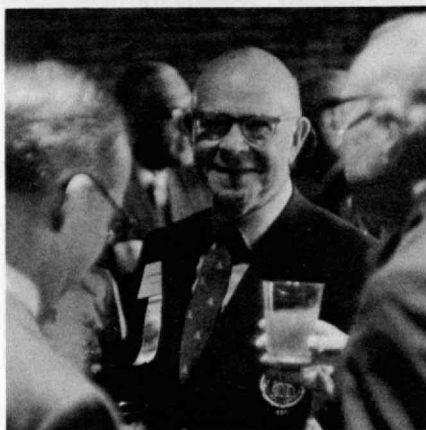
When question time came, one alumnus wanted to know whether the removal of carbon monoxide (by oxidation) did not simply produce another pollutant ( $\text{CO}_2$ ); he learned that increasing dioxide levels might indeed produce a small change in climate over a century or so, but that monoxide is a real poison. Another was told the objection to incinerating plastics; many break down into such damaging substances as hydrochloric and hydrofluoric acids. A third, that electric cars might indeed reduce pollution because emissions from the central plants from which their power might come are easier to control than emissions from uncounted numbers of internal-combustion engines.

One alumnus wanted to switch all power generation to nuclear and low-sulfur fuels forthwith and learned of certain economic difficulties. Another, particularly concerned with nuclear heat- and radiation-pollution, gathered that everything has its penalties. Could we not construct a model of all forms of pollution, so that different control programs could be subject to cost-benefit analysis on a unified basis? Perhaps.

The many-sided programs resumed after luncheon. While several hundred alumni engaged in a "rap" with students and J. Daniel Nyhart, Dean for Student Affairs (see p. 105), others returned to classrooms and laboratories.

Perhaps the most striking performance in the open house at the Center of Advanced Visual Studies was poetry-reading dynamically accompanied by a whole battery of slide-projectors—for once, a really successful attempt at this genre. Another multimedia item was a music-and-light system which transformed the sound-patterns of any piece of music into a shifting blaze of colored asterisks on a wall-sized screen. Gyorgy Kepes, Director of the Center, later recalled that one alumnus thought his children might understand the show, but. . .

*Back on the campus for a long week-end after 50 years, the Class of 1920 found everything different but their colleagues. There were garden parties, campus tours, and the Class Dinner with President Johnson (left, below, with Class President Norris G. Abbott, Jr.).*



A kaleidoscope of Cambridge class reunions, left to right, top to bottom: the Class of 1910 Banquet in the 20 Chimneys, and the Class of 1965 campus picnic; the Class of 1945 at registration and cocktails in Baker House; the Class of 1930 at the President's House, and the Class of 1965 in the plush suite atop the new State Street Bank Building.



Martin A. Abkowitz, '40, Professor of Naval Architecture, put a model of a container ship through its paces in the Towing Tank, which was lined with spectators from end to end. "The new M.I.T. electric car" was not ready, but Richard D. Thornton, Sc.D.'57, Professor of Electrical Engineering, had components and diagrams; and his laboratory was packed for about an hour.

Though preparations were extensive, Fernando J. Corbato, Ph.D.'56, Professor of Electrical Engineering, encountered equipment trouble during his demonstration of the MULTICS time-sharing system; a few alumni showed real enthusiasm for a chance to "talk to a computer," but it seems that there is still a barrier between current computing possibilities and their potential users.

### **The President's Report to Alumni: "No Apologies to Anyone"**

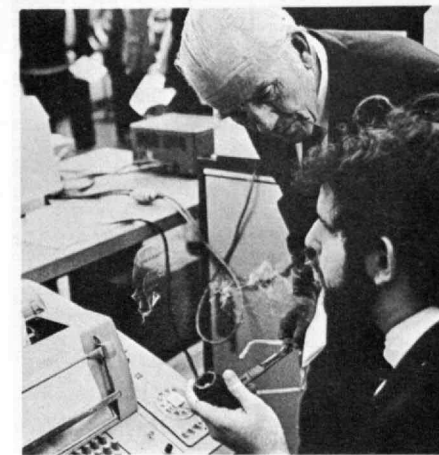
Through a year of turmoil and distraction, M.I.T. has remained in 1969-70 steadfast to the principles which have made it great: the quality of its educational experience, the accountability of all its community, the concept of an open institution, the dedication to service.

"We make no apologies to anyone," declared Howard W. Johnson, President of the Institute, to 1,000 alumni and guests at the Alumni Homecoming Day luncheon. "We never have, and I hope we never will."

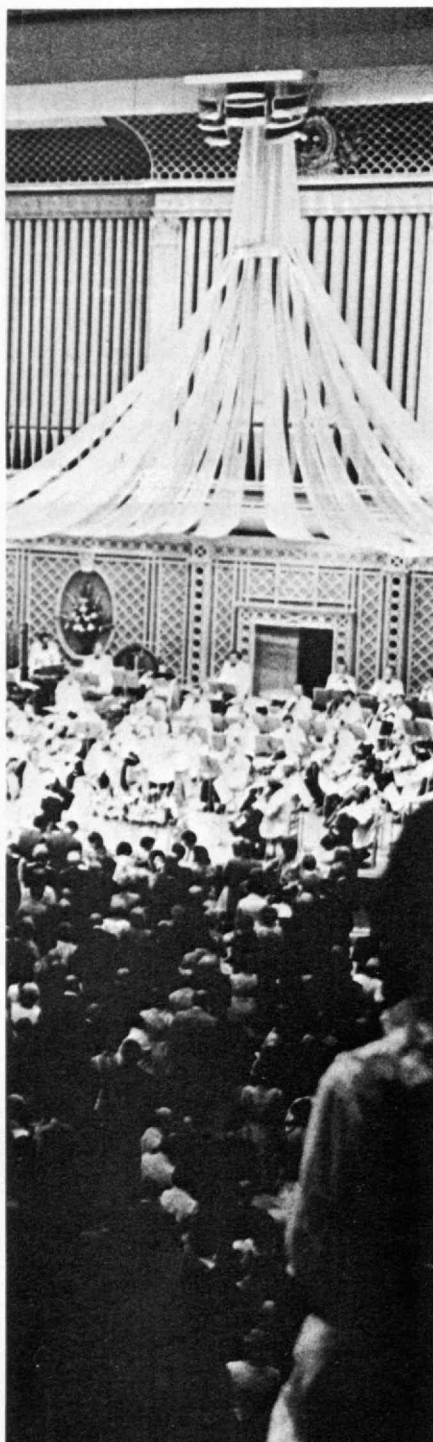
In his informal report on the year at M.I.T., President Johnson cited 11 major developments:

- ◇ Physical changes on the campus, including completion of the Dreyfus Building for chemistry, the Barker Library, and additions to the hydrodynamics laboratory.
- ◇ Major changes in undergraduate curricula, including especially experimental "colleges" for freshmen and increasing opportunities for project work at all levels.
- ◇ Increasing numbers of blacks and other disadvantaged young people among the student body, whose performance has been "outstanding."
- ◇ Advances of M.I.T. teaching and research into new fields, including health services, the delivery of health care, and environmental quality.
- ◇ New policies to guide M.I.T.'s management of defense research in Lincoln Laboratory, and the gradual divestment of the Draper Laboratory ("We have moved from one period of history to another with honor...").
- ◇ Radical action against M.I.T. in November and again in January. ("We have endured a major assault on the institution without damage to its fabric.")
- ◇ The maintenance and continuation of R.O.T.C. programs—for those who wish to pursue them.
- ◇ New responses to political challenges, when students and staff sought this spring to express their views of American military policy and yet to maintain their

More than 3,000 alumni were rewarded for their visit to M.I.T.'s 1970 Alumni Homecoming by the usual good food and good friends, by conversations with students and M.I.T. faculty, by the traditional ceremony (top right, Philip H. Peters, '37, President of the Alumni Association, presents the gavel to his successor, Paul V. Keyser, Jr., '29, right), by a memorial service in the M.I.T. Chapel (next page) and by the Boston Pops Orchestra's rousing rendition of "Arise Ye Sons . . ." (next page). (Photos: Donald L. Estes, '71)







commitment to the nation's political system and the concepts of higher education. ("The way we faced those challenges will put May down in academia as a very special month.")

◇ Further development of effective judicial systems for students and faculty alike ("... a complicated issue which has so made difficult the resolution of campus disputes this year.").

◇ The continuing and increasingly high quality of M.I.T.'s faculty, as evidenced through their contributions to both teaching and research.

◇ The responsibility and achievement of the Institute's students through their academic attainments and especially through their roles in the M.I.T. and Cambridge communities.

But, said President Johnson in ending his recital of the Institute's 1969-70 achievements, "it is foolish to pretend that there are no problems as we finish the year." He cited three:

◇ The crisis of financing which is affecting private institutions throughout the U.S. and to which M.I.T. is especially susceptible because of its emphasis on science and engineering.

◇ The tendency of academic faculties to take political stands in behalf of their institutions. ("I regard the politicization of an educational institution as a loss of franchise which risks our opportunity to make our special kind of truly intellectual contribution. Can educational institutions remain rational places where all points of view may be expressed? They must; for if they cannot, we shall be entering a new dark age.")

◇ The growing mistrust of science, after 25 years of unprecedented public support for institutions and industries based upon scientific advance. ("A great deal of effort must be made to state the case for science in the years ahead.")

Its greatest assets, said President Johnson, are the "human qualities of this institution—of its students, staff, and alumni—in meeting the kinds of tests with which we have been confronted this year. I congratulate the alumni on what you have done," he said, "and on what you will still do."

President Johnson obviously enjoyed the ritual of receiving the reunion class gifts during the 1970 Alumni Homecoming Day luncheon: (above) Max E. Ruehrmund for the Class of 1945, (left) Gregory Smith for the Class of 1930, and (right) L. G. Lee Thomas for the Class of 1920. (Photos: Donald L. Estes, '71)

## Reunion Gifts: Reaching Toward a Record for the Alumni Fund

Reunion gifts amounting to \$616,330 were announced by the 50-, 40-, and 25-year classes at the 1970 Alumni Homecoming Day luncheon on June 15. The funds were raised by the three reunion classes over the past five years.

In presenting the class gift chairmen to in turn make their presentations to President Howard W. Johnson, Philip H. Peters, '37, President of the Alumni Association, announced that as of June 15 total giving to the 1970 Alumni Fund stood at \$2,175,883 from 18,294 individual donors; both figures, he said, represented records for the date. The Alumni Fund total included over \$4,000 pledged by members of the Class of 1970 who had graduated three days before.

The largest class gift was from the Class of 1920, celebrating its 50th reunion; 220 members of the class contributed to a reunion gift of \$192,390. Not included in the gift, but separately announced, was that several members of the class have included the Institute in their estate plans, which would result in M.I.T. receiving more than an estimated \$304,000 in future years. The class gift was announced by L. G. Lee Thomas, Reunion Gift Chairman.

The reunion gift of the Class of 1930, celebrating its 40th anniversary, amounted to \$306,240 from 287 classmates, announced by Gregory Smith, Reunion Gift Chairman.

Max E. Ruehrmund, Reunion Gift Chairman for the Class of 1945, reported a reunion gift of \$117,700, achieved by the participation of 245 members of the class.

# Together We Stand . . .

A majority of Americans, according to a recent Gallup Poll, believe campus unrest to be "the most important problem" facing the country at the present time.

Gallup's result was published just as M.I.T. alumni gathered in record (3,600) numbers for their annual Homecoming to the campus in June. Some years ago, Homecoming was the most traditional and gay of alumni functions; this year handshaking, beer drinking, and Tech Night at the Pops revived warm memories of days past. But this year's Homecoming added a new theme: a series of panels on student attitudes and M.I.T.'s response to student unrest. Homecoming embraced the opportunity to deal with the growing public (alumni) concern about the situation on today's campuses.

So a buffet dinner and Tech Night at the Pops on Sunday were followed by a Monday program of discussions on current technical research and on the student situation. Unless he preferred to tour Boston or hear of M.I.T.'s role in the Apollo Program, an alumnus could, if he liked, jawbone, wring out his worries, and soak up insights about campus unrest from 9:15 in the morning until 5:30 cocktails. The discussions were successful enough to spark some of the more august alumni to invite some students they had met for an impromptu, continued "rap" session after dinner.

Campus administrators, answering questions and questioning answers, exposed alumni to subtleties of campus management unknown in their own days as students. But the real breakthrough was an afternoon "rap" session between 300 alumni and five student panelists in Kresge Auditorium. By contrast with last year's alumni-student encounter, when a small number of students and nonstudents made an issue out of the alleged "superficiality" of the planned alumni program (demonstration; bullhorns; angry, surprised people), the Kresge "rap" was calm and wide-ranging. Both sides seemed aware that M.I.T. had left them in a room alone together for two hours—the two groups capable of vociferously emotional opposition to each other. But the philosophy of "making a plan and letting things happen" worked

well: many in the room had the rare experience of learning that the "bad guy" isn't so bad after all; he may just be O.K.

The students led by presenting their views of the world, M.I.T., politics, and themselves. The President of the Class of 1970, Steven C. Carhart, explained how his generation had never seen the nation "pull together" the way alumni had seen it rally during World War II and previous crises. "We have less trust and confidence in our institutions—that's the crucial difference," he concluded. The others echoed his "we've got to improve things" philosophy from everything from the Movement for a New Congress to M.I.T. disciplinary reforms.

Alumni response varied, but it tended to center on the "we thought the world was pretty awful, too, when we were young" theme. One gentleman read a long speech about what his generation had achieved; another explained why he was working past the retirement age: "I have some of the money and manpower to go on solving these problems." One woman rose on behalf of The Class of 1945: "I don't think anyone has missed the experience of learning that the world isn't all it's cracked up to be."

The only emotional heat turned on the discussion of drugs. The students' view added up to the statement that drugs are a modern fact of life. The alumni took a more serious stand: drugs are a threat which must be controlled.

Despite these differences, there was a similarity in the two groups which carried the day. The alumni kept saying what a terrible state the world used to be in, and how they had improved it; the students chanted that they found the world in a mess and they would make it better. Aside from differing over their respective points of departure—whether population and pollution is a worse evil than Hitler and Tojo—both groups were saying essentially the same thing. One alumnus said: "It was impossible to dislike these guys. Even if you didn't agree with them you had to be kind of proud that they were thinking and working so hard about the problems."

M.I.T. alumni are part of that American

public which reads headlines and is sampled by Gallup, and, today, the campus has become their Most Important Problem. This is changing—one might say drastically—the traditional posture of alumni, both at M.I.T. and other colleges. The alumnus today who writes a troubled letter to the President of M.I.T. may be reacting as much to events at Berkeley or Kent State as to anything local at M.I.T. In the old days, the angry alumnus, having heard there was a liquor scandal on campus, wrote an angry letter saying, "Why don't you throw the troublemakers out?" But at Homecoming, 1970, that question was repeated almost plaintively—not with the aim of rebuking M.I.T. but to hear something authoritative about "the troublemakers."

This national change is having a clear impact on alumni-college relations. In the old days, it could be assumed that an alumnus' letter was, in fact, all it purported to be. But the "campus unrest" issue has become so charged emotionally that alumni now turn to the school they know best and trust to find a yardstick for understanding campuses everywhere—and even their own children.

The students involved in the Kresge panel have expressed an eagerness to go on the road for M.I.T., to talk to alumni wherever invited. One even says he wants to ask the alumni about "where they are at." Kresge panel moderator J. Daniel Nyhart, Dean for Student Affairs, approves—and is anxious to help. Many at M.I.T. are in favor of this notion—a traveling panel of and about students, for alumni. Alumni who wish to explore this further should contact either the office of Alumni Clubs or the office of the Dean of Student Affairs.

There is a jive (slang) word meaning that something is first-rate: "together." Of course, a psychologist would say that a person is best off when the parts of his personality work together. The same applies to a country. M.I.T., like many U.S. colleges, has suddenly found itself with two live-wire constituencies in the two parts of the nation which the media portray as diametrically opposed. Surely the afternoon discussion in Kresge was, and brought them, "together."—D.S.

## Thinking into the '80s

Already hard at work, the Alumni Officers' Conference Committee—A. Rufus Applegarth, '35, Chairman—is structuring a program for returning alumni officers—a program it hopes will be particularly innovative and participative. The Conference, to be held October 16 and 17, will focus on the work of the M.I.T. Commission (see pp. 83-84). Its aim: to project the thinking of alumni officers from the 1970's into the 1980's, Mr. Applegarth says.

## Club Notes

The M.I.T. Club of **Northern New Jersey** met on May 20 at the Hotel Suburban in Summit to present its Outstanding Alumnus Award for 1970 to Everett W. Vilett, Class of 1922. In addition to his many professional and community activities and his service as educational counsellor for the Institute, Mr. Vilett has been a loyal and active member of Northern New Jersey's Club since its beginning, serving as its president from 1937 to 1938 and as treasurer of his Class since 1952.

"Planning the Future of Maine's Coast" was the topic of the spring dinner meeting of the M.I.T. Club of **Western Maine** held on April 16 at the Holiday Inn in Portland. Dr. David R. Fink, Jr., consultant and president of TRIGOM (The Research Institute of the Gulf of Maine), spoke to the group about the activities of TRIGOM, an organization sponsored by several Maine colleges to promote marine research in planning the protection and development of the Maine Coastal Zone.

On May 20, the second annual joint meeting of the M.I.T. Club of **Fairfield County**, the Wellesley Club of Southwestern Fairfield County, and the Wellesley Fairfield Village Club welcomed as guest speaker John J. Frey, President of the Famous Schools of Westport, a most successful mail order school offering cultural courses. Mr. Frey's topic, "Lifetime Learning at Home," considered the interest of today's colleges and universities in increasing their participation in the lifetime learning activities of their alumni—activities which are expanding

from subjects relevant to professional growth to those providing cultural enrichment.

Welcoming incoming freshmen, their parents and undergraduates was the major activity of the M.I.T. Club of **Chicago** at its annual reception held this year on June 16 in the Terrace Room of the Sherman House.

Fun-loving members of **Southwest Florida's** M.I.T. Club came together on April 19 to enjoy their annual spring picnic, with fun, good chatter and all-you-can-eat, at Bill Grunwell's ('28) "Airy and Shady Acres" on Lemon Bay near Englewood, Fla.

## Deceased

Mrs. John H. Lambert, '98, February 6, 1970  
Percy W. Witherell, '99, May 22, 1970\*  
Clifford B. Clapp, '02, September 5, 1969  
James J. Mahar, '02, January 28, 1970  
Walter D. Estes, '04, June 16, 1970  
Frederick G. Dempwolf, '07, January 4, 1970  
John E. Moore, '07, November 15, 1968  
Michael J. Daley, '09, November 29, 1965  
Edwin K. Jenckes, '10, August 9, 1967  
Tom W. Saul, '10, April 4, 1967  
Laurence G. Odell, '11, April 25, 1970  
Charles F. Cabeen, '12, November 16, 1969  
Joshua C. Pratt, '12, May 10, 1970  
Jacob S. Wise, '12, October 17, 1969\*  
George A. Dempsey, '13, June 15, 1970  
Albert N. Henriksen, '14, May 13, 1970  
John E. May, '14, July 13, 1969  
Starr W. Stanyan, '14, August 12, 1969  
Clinton W. La Fetra, '15, May 1, 1970  
William B. Leach, '16, May 8, 1970\*  
Kenneth M. Childs, '17, June 5, 1970  
Walter C. Gartner, '17, June 20, 1970  
Stuart W. Gurney, '17, May 3, 1970  
Charles E. Richardson, '17, n.d.  
A. Edward Tuttle, '17, May 14, 1970\*  
Helen B. Colson, '18, December 25, 1969\*  
James A. Howe, '19, October 25, 1969  
Walter M. Howlett, '19, May 31, 1970  
Roger M. Leland, '19, May 5, 1970  
Arthur E. Farrington, '20, May 3, 1970\*  
Robert R. Rowe, '20, March 25, 1970\*  
Justin Richard Curry, '21, April 5, 1970\*  
Willis L. MacComb, '21, January 5, 1970  
Arthur Warren Norton, '21, May 20, 1970\*  
Herman F. Davies, '22, December 6, 1969

Paul R. Nash, '22, December 15, 1969  
Arthur L. Carvill, '23, March 29, 1970  
Henry B. Dupont, '23, April 13, 1970\*  
Edward R. Barnard, '24, December 21, 1967  
Benjamin J. Bean, '24, July 17, 1969  
Howard W. Emerson, '24, June 20, 1970  
Paul Kusnitz, '24, June 11, 1967  
Howard W. Lewis, '24, May 27, 1970  
Richard H. Pembroke, '24, March 15, 1970  
William K. Schweitzer, '24, September 12, 1969  
William S. Bishop, '25, March 29, 1970  
Trafton B. Mason, '25, February 24, 1970  
Harry Postal, '25, January 25, 1969  
Robert S. Chidsey, '26, May 11, 1970\*  
Leroy B. Copley, '26, March 3, 1970  
Herbert S. Pink, '26, July 9, 1970  
Louis Pirola, '26, February 7, 1970  
Robert M. Bigelow, '27, May 21, 1970\*  
James T. Henry, '27, August 6, 1968  
Harold L. Van Alstyne, '27, August 23, 1969  
John S. Wiebe, '27, December 24, 1969  
Ludger Gagnon, '28, March 5, 1970  
Joseph D. Guertin, '28, April 19, 1970  
Paul T. Rumsey, '28, January 18, 1966  
Richard R. Wolfe, '29, April 29, 1970\*  
Willard B. Landis, '30, October 14, 1969  
Mrs. Samuel McMurtrie, Jr., '30, January 3, 1969  
Harold H. Carr, '31, April 16, 1970  
Arthur G. Russell, '32, May 15, 1970\*  
Eugene P. Worthen, '32, December 4, 1969  
Robert A. Ghelardi, '34, July 17, 1969  
George G. Garton, '35, April 28, 1970  
John J. Ryan, '35, November 10, 1969  
John C. Wrenn, '35, February 6, 1969  
Harry T. Pekin, '36, May 3, 1970\*  
Felix L. French, '39, May 11, 1970  
Andre F. Leman, '40, August 8, 1969  
James F. Sheehan, '40, May 5, 1970  
Rodney H. Smith, '43, December 31, 1968  
Hector J. Cardenas, '46, September 1969  
Thomas Reid, Jr., '46, August 7, 1969  
Milton L. Vogel, '47, October 21, 1969  
William P. Van Riper, Jr., '52, March 21, 1970  
Allen L. Hatch, Jr., '54, March 3, 1970  
Robert J. Seid, '61, September 17, 1969  
John F. Byrum, '65, May 9, 1970  
George W. Morse, H. M., May 25, 1970  
\*Further information in Class Review



# Alumni Correspondence

## Of Haberdashery and an Unwarranted Exclusion

To the Editor:

As one who has spent the last 20 years assuring each person that I meet that I am not the person who owns the clothing store across the street, I wish to protest most vigorously my unwarranted exclusion from the list of distinguished namesakes on page 102 of the April issue of *Technology Review*. Perhaps it is mere snobbery on your part. Perhaps it is a retaliation because my namesake has not advertised in your magazine. At any rate, I have already advised my mother that I have had enough of this and that in my next incarnation I expect to be named Brooks Brothers and have Joyce Brothers as a sister.

The only bearers of this name to make the *Encyclopedia Britannica* were Baptist ministers of the last century in England, but I thought that you had a wider and more cosmopolitan circle of readers. My great grandfather was the youngest of 17 children, and since all the Bible names had been used up it was considered that a Baptist preacher was better than nobody. So I have a legitimate claim to the name, having inherited it directly; it is nice to have had great grandparents.

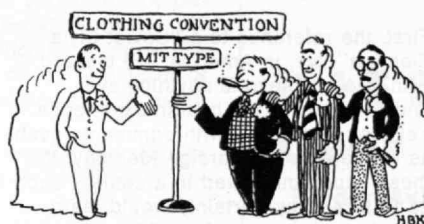
It may be of interest to you that there are no less than 33 listings in the Baltimore phone book for variations of the name Robert Hall. In St. Petersburg, Fla., there were six who could afford a phone, and that there were others I have no doubt because I have been trying since last November to recover \$187.62 paid by an erring escrow company out of the proceeds of the sale of my house to satisfy a judgment against one of my less solvent namesakes.

To save my youngest son the embarrassment of such a common name, I have named him John, after carefully checking to verify that there are only 32 listings of that name in the Baltimore phone book.

Robert Hall, '40  
Baltimore, Md.

*Mr. Kane's apology to Mr. Hall (below) also includes the following explanation: "Had I thought of the category of men's*

*clothing I could have put it to good use. I might well have shown you and the six other Robert Halls exchanging greeting with your fellow-alumni Hart, Shaffner, and Marx (of whom there are, respectively, 29, 2, and 8)."*—Ed.



## Leading or Following?

To the Editor:

In resolving the debate over the future of the special laboratories, M.I.T. has once again exercised a balanced wisdom which all interested in the debate can applaud. In my years in student government, I observed with awe and came to appreciate profoundly—and still do—the breadth of overview brought to bear on the Institute's problems, always with the underlying philosophy that an aggregation of capable minds, given free rein in an atmosphere of mutual respect, will find a course workable for all. President Johnson deserves the support he asked for in his statement to the faculty.

One leaves the debate over the laboratories, however, with a question about how the issue arose in the first place: In turning away from research in operational weapons systems, is M.I.T. acting or reacting? Leading or following?

It cannot be doubted that the Corporation gave full weight to the effects of its decision upon national defense. The thought must have been voiced that essential work would continue to be done at other institutions, in independent organizations such as the Draper Laboratory will become, or as a last resort at wholly governmental places on the style of N.A.S.A. Doubtless, the obverse thought was heard, that if M.I.T. does not find such work respectable, where will people be found who do? Neither can it be doubted that full consideration was given to the hazards of dropping endeavors of assured importance and re-

wards while the missions proposed to replace them are still seeking form and footing. Surely effects of the move on teaching and learning opportunities were amply discussed. But were these matters really the ones under discussion?

The environment and the cities cry for attention. Labors in this sphere may produce technological advances equal to those made at M.I.T. in 30 years of military-oriented research. Whether they do or do not, as President Johnson has said, M.I.T. belongs where the action is, and it is right that growing emphasis should be upon analysis and improvement of the nation's conditions of life. But doesn't "where the action is" mean "everywhere the action is"?

It is profoundly to be hoped that M.I.T. felt the spirit of de-emphasizing an endeavor now less relevant, or perhaps well explored and therefore less productive, and of entering an arena full of promise and teeming with lessons to be learned. This spirit could be called action and leadership. It would be something less if it were simple distaste for the uses of technology, for in this stance there is a whiff of distaste for, or at least doubt and defensiveness about the importance of, technological progress itself.

Michael B. Boylan, '54  
Houston, Texas

## On Discipline and Coercion

To the Editor:

Governor Williams of Arizona is quoted in a Phoenix newspaper as calling "for early review of campus rules . . . to deal with student disorders and . . . expulsion of troublemakers from state universities. The people of the nation are going to have to determine soon whether universities are social action agencies, staging grounds for strikes and revolution, or institutions of higher education. It might be well to have a plebiscite of all students to determine if they want a strike or not. If they do, then close the institution down. Or if enough students . . . want to continue their education, dismiss those who don't . . . and establish what courses are economically feasible for the remaining students."

As a taxpayer, I am interested in knowing what portion of the cost of a college education is borne by public funds and what portion by alumni and other non-tuition sources? And where does the ultimate authority lie in establishing and enforcing disciplinary procedures on a university campus?

In life off campus, are not those responsible for disturbing the peace made to cease or, as lawbreakers, to become subject to fines, imprisonment, or both? Should not the same rules apply to those who disturb the peace on campus?

Is there any reason to spare those who forcibly deny others the peaceful acquisition of an education, or the peaceful conduct of other campus activity? Is there any reason to spare those who forcibly deny to other students voluntary participation in R.O.T.C. or job interviews with prospective employers?

Should not the university discipline those students or faculty who interfere with the rights of others, and expel those who will not desist? Is it "academic freedom" to allow any number of students or faculty, whether a minority or a majority, to deter the university from granting a higher education to those who want it? And if a university cannot or will not make its primary purpose the granting of a higher education, is there any reason why taxpayers, alumni or others should be asked to subsidize those who attend for other purposes?

One does not fault those students or faculty who, on their own extracurricular time, peacefully involve themselves in the political or social issues of the day, nor the inclusion in appropriate courses of reference to current events. But is it not time we denied public funds and facilities to those who insist on consuming much-needed curricular time for such extracurricular activity? Few off campus consistently enjoy any such luxury.

Nor can one fault those students or faculty who wish to demonstrate their concern in a peaceful manner that addresses itself to the conscience of others. But is it not time we expelled from the campus, prosecuting if necessary, those who resort to disruption of campus activity, destruction of the property of others, or disobedience to constituted authority? Few off campus enjoy any such immunity.

Should a college administration, by acquiescence and amnesty, encourage those who, in support of any cause no matter how worthy, not only insist on being listened to, but also insist on being heeded under the threat of destruction of facilities and disruption of academic processes?

Is it not time that state governments or other public authority act in those cases where a college administration is submitting to coercion, and is proving itself incapable or unwilling to discipline or expel those guilty of conduct that

would not be tolerated off campus?

I believe these are questions being asked by the majority of the public who are in sympathy with and who, by their taxes, gifts and tuition payments, support higher education. I believe they deserve a considered response.

Dean C. Picton, '44  
Toledo, Ohio

### On the Irrelevance of Politics

To the Editor:

I read with some dismay the two letters entitled "Soviet-Style Election" and second, "Toward Representative Government" (Technology Review for May, p. 93) submitted by obviously young alumni. It is most unfortunate that someone has not been able to reach these young people and explain to them the practical problems associated with volunteer work either for the Alumni Association or any other volunteer, charitable, or educational activity.

First, the reference to a "Soviet Style Election": we, in America, are blessed with freedom beyond anything ever known before in the human experience. Yet they degrade it with comments such as references to a foreign ideology. If these young men lived in a country such as Russia, they certainly would learn quickly that they would not be permitted to write nor would they have ever had their critical letters published; their argument in that area is a very poor one.

More important, I think they do not understand how alumni officers are chosen, and perhaps someone should explain it. First of all, there are three basic areas of activity—the club area, the Educational Council, and the Alumni Fund. In order to be considered for a national office it is necessary that an alumnus participate in these local activities for many years and then, as a result of proven leadership in these areas, he is recognized and given an opportunity to serve on a national committee or as a national officer. Those of us who have been active in these activities for many years learn quickly that in order to serve effectively we must be able to give a large portion of our time and, further, must have the necessary resources to be involved in these activities. To be selected for a national office and to live a distance from the Cambridge area involves even more time and money.

Regarding the political points of view of alumni: this criterion for selection to national office is neither relevant nor proper. The only criterion for selection is, Can you serve the Institute effectively, regardless of your political persuasion? After all, the purpose of M.I.T. is an educational institution and not a political one.

Therefore, to my young colleagues I suggest the following: if they want to be chosen as an alumni officer, first, work at the local level; second, give generously

of their time and money; and third, and most important, by so doing *earn* the right to be chosen by the National Nominating Committee for the various national offices.

Stanley M. Proctor, '43  
Cleveland, Ohio

To the Editor:

This letter is a response to one printed in your May, 1970, issue (p. 93) from Messrs. Rome, Sirbu, and Kaplan.

Take heed, gentlemen, that your plea for more representative elections to the Alumni Association is not going unnoticed. As a newly elected member to the National Nominating Committee, I will accept with pleasure and give careful consideration to any proposed candidate that you or any alumnus may have in mind for any office. More consideration will be given to those names which are furnished with a statement of opinion from the candidate, which is, I believe, your own suggestion.

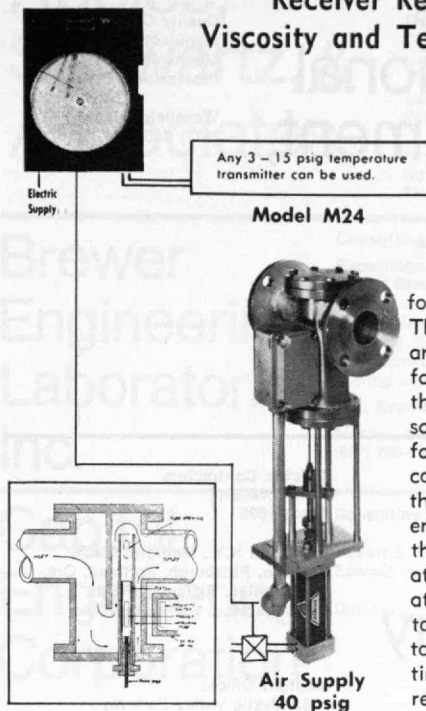
I would like to say, however, that I disagree strongly with your feeling that M.I.T. alumni are not adequately represented in the Alumni Association. As an active member of the M.I.T. Club of Northern New Jersey since graduation, I can say quite frankly that the M.I.T. alumnus who wishes to be represented can find adequate satisfaction in this regard if he desires it. Geographical location is not a sufficient excuse for not being active in alumni affairs. The average M.I.T. alumnus is an extremely busy person with interests that lie primarily outside of active participation in alumni clubs. Motivating the average M.I.T. alumnus is an extremely frustrating task, as I well know because I've been trying for 12 years.

Your comment regarding those alumni working at or near M.I.T. is ludicrous on the face of it and I think exemplifies the limited available time or disinterest on the part of the alumnus rather than his having adequate knowledge of the current activities at M.I.T. As we in the Northern New Jersey Club have found, the reason for having such a club is as much social as it is functional.

I hope that my letter will be the beginning of an answer to your last paragraph which questions the way in which an alumnus may change the current system. Do not accept my response to mean that I doubt the value of the system that exists, but rather that I as a member of the committee (if not the entire committee) to have an open mind regarding the selection of candidates for office on the Alumni Association. Should I find that this feeling does not exist among other members of the Nominating Committee, you may rest assured that this will be voiced in a future letter and that my resignation from the committee will be submitted at that time.

Roy F. Thorpe, '58  
Mountainside, N.J.

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# Class Review

## 94

We are pleased to report the following correspondence from Mrs. **Caroline Whitney Barrett** of "Strawberry Hill," Ipswich, Mass. "It is always a deeply emotional occurrence whenever even the most formal word comes to me from my beloved M.I.T. Even my hundred years proves no abatement and I insist on no abatement of its glory, ever."—Eds.

## 95

Glad to report that a telephone call to the convalescent home where **Luther Conant** is told us he is the same. He does not walk but is able to sit in his chair.

At this writing, I am not sure that I will make the Reunion Luncheon at Phi Beta Epsilon frat house next week. Fraternal Greetings to all the Brothers.—**Andrew D. Fuller**, Secretary, 1284 Beacon St., Brookline, Mass. 02146

## 96

Back in the days of the Great Depression there was a group of owners of small racing sailboats and an almost defunct yacht club in Plymouth. A December-May union of the two was brought about by the hard diplomatic labors of a few men, two of whom were your classmates, the Hedge twins. The present sailors (and monkey-wrench sailors) appreciate the foresight of these men who acquired an old lumber yard and its waterfront pier. When I started sailing, **Bill Hedge** was spending many Sundays as the safety patrol while his daughters were following the family tradition of winning a large share of the races. Henry's grandchildren took their places a few years later and now the next generations are in boats. This year a new sewage disposal plant is in operation and a 2,000 foot breakwater reaches its protective arm around an enlarged mooring area. What effects these will have on sandbars, mud-flats and currents will have to be discovered by the youngsters who skipper the boats this summer.—**Clare Driscoll**, Acting Secretary, 11 Cliff St., Plymouth, Mass.

## 98

During my annual Memorial Day trip to Needham, Mass., I visited **Joe Riley** who was again spry after a month's stay in the hospital. Many manuscripts were in evidence on a writing table. He told me that he writes about various subjects for his own amusement. I asked him about the beautiful banjos in the living room. He had made them from discarded pieces of instruments, the handle of a tooth brush, a bed post and other unusual items. He told me about his large family of nieces and grandnephews, a few living in Needham.—Mrs. **Audrey Jones Jones**, Acting Secretary, 232 Fountain St., Springfield, Mass. 01108

## 99

We regret to report to classmates of 1899 the death, on May 22, of your Secretary, **Percy W. Witherell**. Percy, a member of the M.I.T. Alumni Council, was a faithful and long-time supporter both of his class and of the Institute. He leaves three sons, Warren F. of Wellesley, Dana G. of Needham and Richard H. of Wrentham. He also leaves a daughter, Mrs. William F. Gimple of Raynham. We extend our sympathy to the Witherell family.—Ed.

## 03

A noteworthy biography of a distinguished classmate of 1903 has been found in my records, that of **George H. Clark**, Course VI, who passed away in June of 1956 at the age of 75. George was a pioneer in wireless telegraphy and for 27 years was associated with the Radio Corporation of America. He retired in 1946 after serving for 16 years as custodian of historical archives for R.C.A. As custodian of historical archives, he collected and catalogued files of early radio companies, photographs, blueprints and similar matter about the early days of radio. In 1953, R.C.A. presented this collection to George's alma mater—M.I.T.

**James S. Sheafe** writes from the Colonial Inn, La Jolla, Calif., saying that he

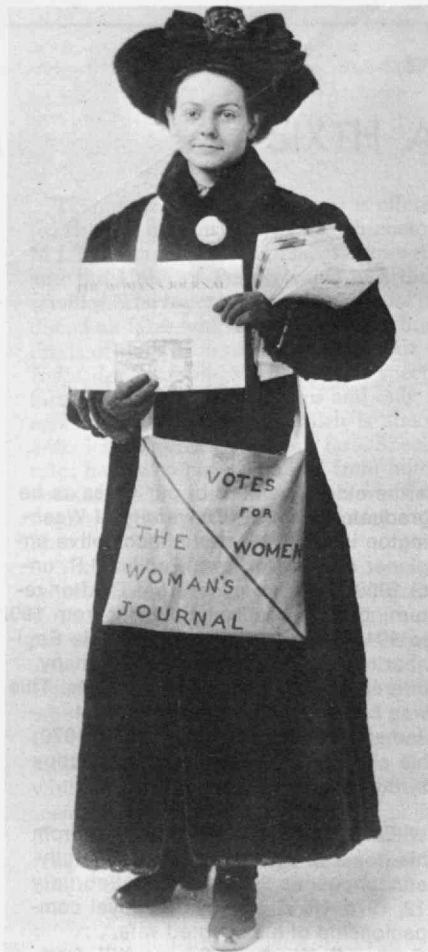
is the oldest member of our Class as he graduated from the University of Washington in 1897. He was a locomotive engineer on the Northern Pacific R.R. until 1900 when he entered M.I.T. After returning to railroad employment from 1903 to 1915, he established the Sheafe Engineering Co. Inc., which took on many interesting and varied assignments. This was his life's work until retirement. James will be 94 on October 12, 1970; his classmates wish him a most happy birthday.

**William L. Lounsbury**, Course VII, from his home in Stoughton, Wisc., joyfully announces his 90th birthday, February 12, 1970. He still enjoys the loyal companionship of his devoted wife. . . . **George E. Kershaw**, Course XIII, from Madison, N.J., is still active and only now after 80 years is aware of approaching arthritis.

The Cambridge, Mass., *Chronicle-Sun* recently published the following account about your Secretary. "The unique experience of attending class reunions at both M.I.T. and Harvard is being enjoyed this week by John J. A. Nolan, a valued contributor of historical articles to the *Chronicle-Sun*. Mr. Nolan, who is secretary of the Somerville Historical Society, is attending M.I.T. Alumni exercises as member and secretary of the Class of 1903, and is attending Harvard Alumni exercises as a member of the Class of 1905. The 65th reunion of his Harvard class will be held at the Carpenter Center for the Visual Arts, with Alfred Carpenter, of Cambridge, Oregon, expected to attend."

**Clarence M. Hardenbergh**, Course II, from Minneapolis, Minn., writes: "Still navigating with 14 grandchildren. One is active on Appalachian Mountain Club Trail Crew; another teaches at Chicago University. We have a summer home in New Hampshire for my gardening and grandchildren during winter periods for their skiing."

**Arthur L. Derby** is reported deceased at Eastham, Va., on August 23, 1961; and **George E. Sibbett** passed away on May 30, 1969 at Laguna Hills, Calif.—**John J. A. Nolan**, Secretary-Treasurer, 13 Linden Ave., Somerville, Mass. 02143



Women's Liberation circa 1919 and one of the many activities of Florence Luscomb, '09, an ardent worker in the struggle to give women the vote. (Photo: Schlesinger Library)

## 09

In the May Review we told of the passing of our classmate, **Francis Soderstrom** and that we had written to Mrs. Soderstrom expressing the sympathy of the Class as well as our own. We are all most appreciative of the reply which we received from her. "Thank you for your kind expression of sympathy. There is nothing I can add to what you already know. We met shortly after Francis retired and came to Phoenix. He seldom mentioned his career but he always said how much he had enjoyed his work. He also enjoyed his retirement. He had no children and treated mine like his own. They were all devoted to him. He had been widowed for 18 years and being part of a family gave him a great deal of pleasure. We traveled a good ideal and he always made friends no matter where we were. Every morning he would go for a long walk and the first stop would always be at a brokerage house. In all our years together he missed a dip in the pool only on rainy days. He did lots of reading and visited shut-in friends. He had excellent health until his last year when the heart condition showed up. Even then he was always cheerful and still a tease."

**Florence Luscomb** is a class secretary's delight in his urgent quest for class news. As will be recalled, in the December notes we included a most interesting letter giving the history of her very active life. In the May notes we quoted from two newspaper clippings. In one Florence deplored the objections to busing children to bring about integrated schools, and in the other she warned against our becoming involved further in the Far East war by rendering stepped-up assistance in arms and "advisers" to Laos.

We are indebted to Chick Kane, '24, former Director of the Alumni Fund for a clipping from *Radcliffe* (their alumni publication) in which is shown an excellent photograph of Florence Luscomb, taken around 1919, selling *The Woman's Journal*, an admirable weekly paper on the votes for women movement brought out by the Blackwell family beginning in 1870. We well remember coming out of a Tremont Street subway exit at the time and there was Florence vigorously trying to induce passers-by to buy the journal. I also remember that her appearance then was just like that in the photograph and today one would have no difficulty recognizing her from the same photograph. The occasion for the early photograph of Florence was the celebration at Radcliffe of the 50th anniversary of women's suffrage and the inauguration of The Friends of the Schlesinger Library.

The library took note of the travails of the decade (1910-1920) that brought women the vote with an exhibit which will be moved to the new Hilles (Radcliffe) Library. Florence's early activities in bringing about women's suffrage and her great enthusiasm must have accounted for her photograph appearing in the magazine. It should be noted that her mother was also an ardent worker for the cause and Florence carried on well the family tradition. The second object of the occasion was to promote and stimulate interest in the recent Women's Liberation Movement. In the *Boston Globe* of May 18, at the top of the page there was the same photograph of Florence together with another picture of the women's victory parade in New York in 1919 after Congress had given women the vote. The article which followed gave a detailed historical account of the fifty-year struggle for suffrage, naming several of the outstanding leaders. The article also told of the contributions which women are making to enhance the liberation movement.

**Laurence Shaw** sent us the following note. "Competition comes up on 15 June. Priority vs effort vs satisfaction. I am treasurer of the Osterville Men's Club, 250 members and 90 on the waiting list; 15 June is our annual Steak Cook-out at Crawford Hollidge's home in Marstons Mills. We set the tables on a flat area between two lakes, one a foot and a half higher than the other. He has a rifle range (telescopic guns) with solid shooting benches and targets across the water against a high bank. Also horseshoes, beer, darts, tonic, etc. I handle the

checks on a prepaid basis and somebody has to be on hand with a list to collect for the extra last-minute guests and note the absentees. I think this is the first year I have missed out. The way I make it is to go up to Brockton overnight and drive to M.I.T. in the morning. I expect to be there next year even if I have to stay over in Brockton with friends two nights. Eighty miles is plenty after a day on campus. Greetings to everybody." We also received a clipping from the *Lower Cape Cod Chronicle* of April 9, which reads: "Mr. Laurence Shaw, a 1909 graduate of M.I.T., who lives on School Street in Cotuit, has contributed a most unique collection of M.I.T. mugs to the 1970 Channel 2 Auction to be held this year from May 30 through June 6. The M.I.T. alumnus has donated a 21-piece set of authentic steins given by the college every year at Alumni Day, usually held in June. The heavy, thick mugs date from 1938 through 1954, the only years the college gave out steins and include four duplicates. Mr. Shaw, a graduate with a Bachelor of Science degree in chemistry, has an incredible record to boast of. He has not missed one Alumni Day meeting since he left the college in 1909. Each donated mug has the date that it was given as well as a design or picture on it. Mr. Shaw is also donating a bronze seal of M.I.T. which was made before 1910 and a plate showing the Baker House, one of the dormitories at M.I.T. Mr. Shaw previously worked for 40 years at the Avon Sole company in Avon. As a chemist he had a big part in the invention of the porous rubber sole." We are pleased that Laurence is not only continuing to be active but has found a useful way for disposing of those mugs, or steins, that once were given us by Naragansett Brewing Company at our alumni dinners.

We have received a notice of the death on October 24, 1966, of **Raymond J. Phelon**. Our records show that he attended the Institute for only one term and that from 1934 he was with the Boston Consolidated Gas Company; since 1954 he had resided in Newton, Mass.—**Chester L. Dawes**, Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; **George Wallis**, Assistant Secretary, Wenhams, Mass.

## 11

In a recent letter, **William Coburn**, who has been an investment counselor for more than 50 years, gave me his reasons for closing his State Street office and continuing only the counselor part of his business from his home at 9 Old Orchard Rd., Chestnut Hill, Mass., 02167. About six months ago he became convinced that Wall St. was headed for bad times. Brokerage houses established questionable branches and hired many poorly trained salesmen without expanding their back office facilities to take care of the extra business. As in 1929, their chickens have come home to roost and some brokerage houses have been forced out of business and others are on the verge of



failure. The same corporations borrowed all they could to expand their businesses and found themselves falling to pieces.

So Coburn got rid of his order department, notified all his clients that he was giving up his custodial department and returned to them all the securities and cash he was holding for them. He was able to terminate the lease on his State Street offices, and on last January 15 let all this office staff go except his secretary-bookkeeper and a part-time stenographer. On March 1, he vacated his office but is continuing to look after the financial interests of clients from his Chestnut hill home.

A few years ago William bought a place on Fisherville Lane in Westport, Mass., for a summer home. It is near the famous Horse Neck Beach and the place where his wife was born. During the past year he added several acres adjacent to his property to prevent unwanted developments. The Coburns still own their farm in New Hampshire and collect antiques when they are available at the right price. Both their Chestnut Hill and Westport homes are furnished almost entirely with authentic antiques. William asked me to extend his best wishes to all our classmates.

The following notes came with contributions to the Alumni Fund: From **L. G. Fitzherbert**, "1969 was a bad year for us—my wife had an accident that put her in the hospital and my youngest son and my son-in-law died. We had to make a trip to California to be with our daughter when her husband passed away. Hope 1970 will be better." From **Ralph Runels**, "If any 1911 Course I men find themselves in Lowell I would be delighted to take them to lunch at the Yorick Club so we could reminisce about the old days. Just call 452-2161, my office, so I will be sure to meet [you]." From **Eldred Besse**, "I finally retired October 1, 1968, at age 80. Expect to spend the summer at my Cape Cod cottage on Mashpee Pond, Mashpee, Telephone 428-8056, June to November. Have been hospitalized twice but should recuperate with good Cape Cod air."

From *The Savings Banker* for March, 1970, we learned that **Walter C. Wilson** has retired as President of the Central Savings Bank of Lowell. Walter is Chairman of the Board of Andrew Wilson Co., of Lawrence and lives in Andover.

I recently received word of the death on December 21, 1969, of **Karl B. Kilborn** in Akron, Ohio. Karl was born in Portland, Maine and attended Portland High School and Bowdoin College before coming to Tech where I remember him as one of the brightest members of Course II.—**Oberlin S. Clark**, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

# 12

DO YOU REMEMBER the Tech Show chorus practice? "Us girls" had to prac-

tice for weeks on how to walk on high heels, and gracefully. I still recall these sessions whenever I see a young lady balancing down the street on spike heels.

News seemed so scarce this month that we made a number of phone calls to "delinquents" to whom four or more letters have been sent with no reply. **Rowland Wright**, Course VI, was pleased to hear from me at his home in Des Moines, Iowa, and we had a most interesting chat. Both he and his wife, Connie, are in reasonably good health except for his poor vision, which prevents him from driving or much reading. Rowland came to Tech from Yale and Columbia in 1910. After graduation he started his career with Goodrich Rubber Company in Akron, Ohio, and then was with the Diamond Rubber Co. for a few years. He worked for an appreciable period with Stevenson, Harrison and Jordan, industrial engineers of New York until 1930. His duties required considerable travel in the midwest. Later he transferred to their accounting department and, in 1931, he accepted a position as accountant with the Meridith Publishing Co. in Des Moines, Iowa. He soon became comptroller of the company and in 1953, retired as treasurer. The Wrights have two sons and a daughter, four granddaughters and two great granddaughters. Both sons work with I.B.M. at their Connecticut and Colorado plants. Rowland recently celebrated his 82nd birthday and says that with the aid of a dozen or more pills a day he hopes to enjoy many more. He has seen or heard from no classmates for years, but asked particularly to be remembered to George Sprowls and Jim Cook.

In a brief talk with **Robert Stobert** I learned that he also came to Tech in his junior year after earlier preparation at the University of Alabama. He has spent most of his career with Hardie, Tynes Manufacturing Co., Birmingham, Ala., manufacturers of heavy machinery, and is presently active as president. His wife passed away several years ago. He has a son and a daughter, but no grandchildren.

**Louis Flett**, Course I, told me that he worked many years as an engineer with Stone and Webster, Boston, Mass., and retired in 1954. He lost his wife in 1968 and since then has been living alone at his home in Lanesville, Mass., near Gloucester. He says he is in reasonably good health. Our best wishes to you, Louis.

We were shocked to learn of the tragic passing of **Charles Cary**, Course I, of Wilmington, Del., on January 22 as the result of injuries suffered in an automobile accident in November. Charles joined our Class in 1910 after graduation from Bowdoin College, where he later served as a member of their Board of Trustees. His history appears in the January, 1968 issue of the *Review*. He retired in 1955 as vice president of the du Pont Company, and had since continued with them as a director. For years

he was actively interested and internationally known for his work with the Y.M.C.A., and was chairman of the North American Committee of their International Missionary Council. Charles was also active in various community, welfare and local church affairs. He is survived by his widow, Frances, two sons, a daughter and 11 grandchildren. We have extended the deep sympathy of our Class in this tragedy.

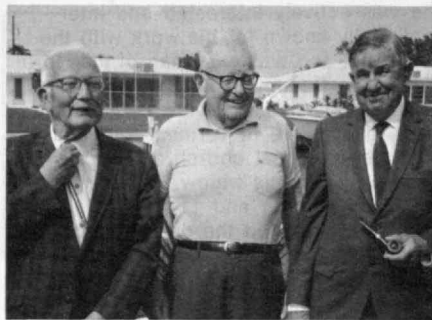
We regret to report the passing, after a two-day illness, of **J. Samuel Wise**, Course IV, which occurred on October 17 in Yazoo City, Mississippi. He was a leading merchant and cotton planter in the district, where he had lived all of his life. He is survived by a brother and a married sister.

We regret to report the sudden passing of **Charles F. Cabeen**, Course II, of Beverly, Mass., from a heart attack, on November 16, 1969. He is survived by his widow, Helen, and two daughters. Though Charles was with us for but one year, he attended our early reunions. I remember him as a good baseball player at our 10th reunion in Plymouth, Mass. Until his retirement he was a plumbing contractor.

**Chet Dows** writes from Cleveland, "As usual, we made our annual Easter trip to visit our son and daughter. Richard works for G.E. at Valley Forge, Pa., and has five children. Dorothy lives in Garden City, N.Y., and has four children. We are about ready to start for our summer camp at Madison, Ohio on Lake Erie and have already made several trips to clean up the grounds and get the place ready for use. The winter was good to us and we both came through in fine shape."

**Phil Jones** reports no news since his story in the April, 1969, *Review*. He is apparently in good health and living alone in his home at Naples, Fla. I am asking him if he has written any more books on philosophy. . . . **Bill Richardson**, Course I, says that he has spent his entire career in his chosen profession. After graduation, he returned to Tech for one year as assistant to Professor Spofford and then accepted a job with Aberthaw Construction Co. in Boston. He soon became employed with M.C. Tuttle Co., building contractors and at their request moved to Scranton, Pa., where he still resides. When the depression struck in 1931, he secured a position with the Scranton Corporation as structural engineer, and remained with them until his retirement in 1954. He quickly tired of too much leisure and became an inspector of building construction for various local architects and builders on a part-time basis; he is still active in this work. Bill married in 1917, and both he and his wife are in good health. They have 5 children, 11 grandchildren and 5 great-grandchildren. Fortunately, most of this large family live not too far away, so he and his wife spend most of their spare time visiting about.





Ray Wilson, Paul Tyler, Harold Brackett  
(all Class of '12) at the Tyler home in Florida.

Talking recently with **Leslie Duke**, Course III, I was pleased to learn that both he and his wife are in good health and that he is still working full time as manager of the Paramount County Water District, Paramount, Calif. After graduation he spent about two years as a "miner" at a gold mine in Wickenburg, Ariz., which apparently convinced him that he had enough of this kind of work. So he went to Hawaii where he spent a short period as an assistant with the local government in Maui. During World War I, he was commissioned as 2nd lieutenant in the air service and was trained as a bomber pilot. After an M.I.T. course in aeronautical engineering, he was assigned to the Air Service Engineering Division in Dayton, Ohio, doing experimental work in aeronautics for the government. After discharge in 1919, he went to California to work with his father, leaving in 1925 to become an executive with a tile manufacturing company. In 1928, the new community of Paramount needed a water supply and Les became interested in the design and building of the system which has been operating successfully under his direction for 42 years. Presently, he has no immediate plans for retirement. Les was married about 1920 and has 2 married daughters, 2 granddaughters and 2 grandsons, one of whom is presently at New College in Sarasota, Fla.

We have received an inspiring note and generous contribution from **John Hargrave**, who greatly appreciates our Class News. John successfully directed the activities of the Cincinnati Tool Company for 42 years before selling out and retiring to Thomasville, Ga., where he had a sizeable farm. This he later sold and moved into town. His health and that of his wife is reasonably good, although arthritis has curtailed his traveling and he has also had to stop playing golf, even with a course just across the street. Our very best wishes to you, John; your attitude towards life is most inspiring.

**Harold Mitchell** writes from Buffalo, "Nothing new hereabouts to report. Early in April this year, I saw over 4,000 Canada geese in an area about 35 miles northeast of Buffalo which included the Iroquois Wildlife Refuge, as well as the Oak Orchard and Tonawanda State

Conservation areas. Could I have covered all of these areas in a day, the number might have been doubled. The region is a favorite stopping place for geese and other waterfowl during migration from Virginia and the Carolinas to their breeding grounds in Northwest United States and Canada."

We recently heard from **John Hall**, our "rollingest stone" in the Class, whose story appeared in the March issue. We are now proud to report a recent news release stating that on April 3, John received a special presentation and award from the New Jersey Health Officers Association for distinguished service to public health. As previously reported, John's official activities have included not only New Jersey, but also work with state or government departments in New Brunswick, Canada, Alaska, Nevada, Maryland, Massachusetts and Pennsylvania, as well as with the Army in France during World War I. In 1953, the American Social Health Association awarded him honorary life membership. Our hearty congratulations, John!

**Howard Cather** reports an enjoyable winter in Florida where he and Elizabeth spent two months near Naples. He says his bridge is lousy, but that his health at age 83 is still excellent. This he attributes in part to an elderly aunt who raised him; she recently died at 102.

**Frank Caldwell** writes from West Hartford, Conn., "I am a very dilatory correspondent. I was holed up all winter and spent much time reading—mostly biographies. Glad to see the winter is over and that I can again get out on the golf course. Just think, our 60th reunion is close at hand!" Golf at 83! Wonderful, Frank. . . . **Bates Torrey** writes from Syracuse that he is doing quite well after last year's heart attack and feels he continues to make progress. Alice is still confined to the hospital, however, and Bates is living at home alone. I know that he is always glad to see or hear from classmates.

A surprise letter arrived from **George Chambers**, Course I, who has included interesting stories of several classmates. "After graduation I began my career with the New York State Highway Department and first served in both the Rochester and Buffalo divisions; then as engineer for the International Railway, which operated around Buffalo and Niagara Falls, Canada,—Buffalo Grade Crossing Commission. Then I went with the Buffalo Department of Public Works in the engineering and buildings divisions, where I continued until retirement as Director of Buildings in 1961.

"In 1931, while in the engineering division, I was associated with **Arch Eicher** on a project of extending the Bird Island Pier, and building a 10-ft. submerged sewer in the Niagara River, which has an 8 m.p.h. current. He was superintendent for the contractor, American Construction Co., while I ran the field party for the City of Buffalo. I shall never

forget Arch, not only for the memorable field goal he kicked on field day, but also when my wife was blessed with twin boys in 1931, he sent us two sets of bunting outfits for them. I hope Arch continues to improve, and wish to assure him of my deep concern and best wishes.

"In 1921 I married Frances Hager, so in another year we hope to celebrate 50 happy years together. She has established some sort of a record in the completion of 57 years as organist in the Holy Angels Church of Buffalo, a service she is still continuing. We have four sons and five grandchildren. One son, The Right Reverend Monseignor James F. Chambers, has just completed a nine-year term as Vice Rector of the North American College in Rome.

"Recently, I had lunch with **Harold Mitchell** who showed me several reunion snapshots. I had to look hard to recognize **Charlie Carpenter**, **Eric Kebbon**, architect of happy memories, and our worthy secretary, **Ray Wilson**, but knew **Jim Cook** at once, with the same friendly smile we used to see during our days at Tech. Harold Mitchell is a rather modest fellow. He has been writing about his various trips in the class news of the *Review*, but I learned of another accomplishment. He is co-author of a 500-page book, *Birds of the Niagara Frontier*. I found the book most interesting and intriguing, particularly so for those living in the Niagara Frontier. I would like to nominate an award to Harold Mitchell in the bird category—call it the Eagle, Hawk or Falcon Award.

"This summer I am spending a few weeks at Hampton Beach, N.H., as has been my custom for the past 30 years, though the water is seemingly getting colder each year. I am now 80 years old, but like **Cornelius Duyser**, am still able to work my garden. I hope we both may so continue for many years to come. I must tell him, however, that when the troubles in Washington and the rest of the country are settled and gone, his favorite sport of cussing them out will become obsolete, and instead we shall be able to sing the old song, 'Happy Days are Here Again.'"

**Fritz Shepard** spent two weeks in the hospital last winter for treatment after a possible slight stroke from which he is recovering satisfactorily. Fritz has seen **Jerry Hunsaker** often and says he was then planning his usual spring fishing trip to Grand Lake, N.Y. . . . **Phil Dalrymple** is still very active with Jackson & Moreland in Boston. He reports three grandchildren out of nine are now married. . . . **Bob Cox**, Course III, writes from Saratoga, California. "There is no news or excitement. We did take a short trip by auto to Scottsdale, Ariz. over Easter. All is well with us. There are few M.I.T. men here as venerable as I, though I see a few younger ones occasionally." . . . **Cy Springall** and Marjorie say, "No news here. We are glad to be home again in New England with all its beautiful blossoms. Wonder

why we go away. I am trying to play a little golf, strictly one handed, and with my cane." . . . From **John Barry**, "No news since my last report except that we drove to Manasota Beach, Fla., for a couple of weeks in March."

**Rudolph Fox** writes, "Just a word to tell you how much I enjoy the 1912 class columns in the *Review*. We all appreciate and thank you for your work in our behalf. I am not well so must be brief." Rudolph was an active man on campus and a most loyal alumnus. I recall he was the first news contributor when I took over this job in 1967. We sincerely regret that you are not now up to par, Rudolph, and all of us are hoping that your next report will indicate marked improvement. . . . **Harold Brackett** and his niece, Miss Forbes, returned from Florida in mid-April and after two weeks at home they departed for his summer home in Limerick, Maine. . . . We are pleased to hear again from **Joseph Boyer**, Course II, of Gloucester, Mass. He spent only his freshman year with us before transferring to Boston University to become a successful lawyer. He writes, "I still look upon M.I.T. as truly my alma mater. My only recent achievement is that I, as well as my wife, have now joined the ranks of octogenarians. I retired from active law practice some 10 years ago, so my past, though not spectacular, has been much more exciting and quite a bit longer than I expect my future to be."

**Jim Cook** is apparently continuing along at an even pace in Marblehead, Mass., and has no complaints, even with his game leg and hearing aid. He tells me that he is planning to attend the annual Appalachian Club party at Asticou, Maine, next September, after which he will wander further south on the Maine coast for some surf fishing. . . . **Fred Busby**, another active and loyal classmate, writes that he is still teaching math at Manter Hall in Cambridge where he has been employed for the past 10 years. Fred celebrated his 80th birthday on April 18th with his two daughters present, one coming up from Florida with her husband. Our hearty congratulations, Fred!

The mention of an 80th birthday caused us to review our records. We find that as of July, 1970, there are less than 30 classmates under 80 years and a year hence there will not be over five. On the other side of the picture, we now have 10 classmates over 83 years, 2 or perhaps 3 of whom are still working. **Charles McCormack** wins the honor of being the oldest, having passed his 86th birthday. He did not retire fully until 1967. **Ernest De Witt**, **Cornelius Duyser** and **Dave Guy** are but a year younger. I am not sure but that Dave is still serving actively as Director of the Columbia (D.C.) Historical Society.

You will be interested to know that there are presently 129 names on the official class register, of which 88 received degrees in 1912. Most of the others at-

tended for but 1 to 3 years. Of the former, we have received some information from all but two. We have also heard from 9 of the remaining 44 men. During the past three years 33 classmates have died. Sixteen men are still actively employed, and probably at least 10 others are engaged in part-time work, such as church and community activities.

For the past three years we have been able to fulfill our goal of one full page of news in each issue of the *Review*. Most of the "histories" have now been published so we cannot expect that this volume can be continued. We shall strive, however, to print at least one column per issue. This means that we must all make it a point to contribute at least a brief note every six months. I feel sure we can do it. Let us try.

This is the last issue of the *Review* until October-November. I thank all of you who have contributed in making this effort a success, and must also express my appreciation of the many letters of commendation received—although it is the contributions themselves that made this success possible. However, these letters were of great help and have made the effort worthwhile. Also through our correspondence we have become re-acquainted with many from whom we had not heard for years and with others whom we never had known. Best wishes and a good summer. Keep well!—**Ray E. Wilson**, Secretary, 304 Park Ave., Swarthmore, Pa. 19081; **Jay H. Pratt**, 937 Fair Oaks Ave., Oak Park, Ill. 60302

## 13

**Edward Jewett** sends his greeting to the members of 1913: "Hello, gang. I am still alive and kicking. I have a family of pet seagulls who congregate in front of my home each day for a feed of beef suet. This plus lawn mowing keeps me busy."

We have received a very pleasing letter from Jane (Mrs. **Henry O.**) **Glidden** which we pass on to all of Heinie's classmates and friends: "Thought you would be interested to know that Henry has been in the South Shore Hospital, South Weymouth, for an operation, remaining there over three weeks. I shall bring him home tomorrow. Of course he will have to take it easy another month anyway. His spirits are good, as well as his appetite. You may like to know that Henry is to have a painting hung in the Fuller Memorial Art Center, Brockton, May 14 to June 21, along with others of the 11 South Shore Art Associations. Four paintings were chosen from each one by judges. Hope all is well so we can make the M.I.T. reunion in June but time will tell. Trust you and wife are well."

**Harold E. Crawford** forwards two notes as follows: "Please advise program of class function per last class notes in *Review*. Expect to be in East for a few days then." "Thanks for your letter—you're right, we

are planning to attend Rotary convention in Atlanta about June 1. Guess from your letter no special class gathering is planned, so will have to take a chance on seeing some old (80 plus) classmates—maybe more—in 1973. Guess I have not paid class dues, so enclosed is check for \$2.00."

**Alex Pastene** favors us with a report of his activities which he relates: "The date on this belated check will be an indicator of the way time disappears for procrastinators, including me. And it's not that I am hard up, or laid up. So I just better put up. In reasonable health, with useful driving vision from a monocular cataract operation. I am still yard man to a fair sized semi-rural place, and blow away snow in winter—variable amounts as you will be doing yourself. Not south in winter, but northwesterly (to Michigan) in summer has been my seasonal escape route. And I continue to be general repairman; households seem to get many ailments. I did not vote on your questions, but will comment. I see no wisdom in reducing entrance requirements to the Institute. And while student representation on some committee may be a good thing, somehow committee meetings can occupy a great deal of time some of which might well be spent in doing. I have enjoyed reading notes about so many old friends but, with them, sadly view the diminishing number. Just glancing over other class notes recently I suddenly discovered that the current 1912 class secretary, Ray Wilson, was a tour mate on an "old folks" European trip for a couple months in 1961. An ardent photographer, he was also handy with a "sweet potato" on long bus rides. Best wishes, Alex Pastene."

It was very pleasing to learn by letter that **Joseph Wattles**, 3d, of the Class of 1908, formerly from Canton, Mass., has sold his winter home in Venice, Fla., and has taken an abode in a condominium at 1507 Casey Key Road, Nokomis, Fla., 33555.

We were very sorry to learn from the Alumni office that our classmate, **Charles W. Rieser**, 1276 Eldridge St., Clearwater, Fla., 33515, passed away February 10, 1970. We forwarded a sympathy card to his family. Also Fred Lehmann has forwarded a letter of condolence to Charles' family.

Change of address: C. Preble Wetherbee, 1200 Roberts Ave., Mays Avenue, N.J. 08330. Until November, send in your notes and letters.—**George Philip Capen**, Secretary and Treasurer, 60 Everett St., Canton, Mass. 02021

## 14

During May we had the pleasure of representing M.I.T. at the ceremonies connected with the inauguration of a new president at Farmington College which is a branch of the University of Maine. The new president is Einar Arthur Olsen. Our personal part consisted chiefly in donning cap and gown and joining a processional



in the hall, also listening to a number of talks and enjoying some food on the campus.

Which reminds me that Ham tells me that several students who were apprehended breaking into the President's office at M.I.T. are now serving 3-month jail terms in Cambridge. Ham tells me that in general the affairs at M.I.T. have been pretty quiet lately—perhaps due to the jail sentences just referred to.

We have had contacts with **Florence Richmond** who has plans for a European trip with her grandchildren. We are reminded also that **Dinny Chatfield** is embarking in August for an overseas trip to Scandinavia with Lois and their daughter, Debbie.

A note from **Thorn Dickinson** says, "Please change my address from Bradley's, St. Huberts, N.Y. 12943 to Elk Lake Lodge, Blue Ridge, N.Y. 12370" (an attractive photo of it was enclosed). "That's the uncivilized place I have been going to for the last 11 years. Very few people but lots of deer, coons, bob cats and black bears."—**Herman A. Affel**, Secretary, Rome, Maine. Mail: RFD 2, Oakland, Maine 04963

## 15

It's May 15 now, but when you read these notes, our long looked for 55th reunion will have come and gone. Play by play report will be in the first fall issue of the *Review*. Meanwhile more to keep the Class Supreme. On April 17 at The Chemists' Club in New York City 18 of us met for our Annual Class Dinner. **Larry Landers** set this up for us and well deserved the resounding applause he received for his time and effort in making this such a pleasant and interesting evening. After a cocktail hour, the old Pirate, swashbuckling as ever, opened the dinner with his nostalgic and rousing "we are happy" cheer. Present were Sam Berke, Lakeville, Conn.; Dick Bailey and Sol Schneider, Philadelphia; Larry Quirk, Middletown, Conn. Those were the really long distance men. Then from Metropolitan New York City Jerry Coldwell, Alton Cook, Joe Livermore, Gil Peakes, Ray Walcott and Charlie Williams, and over from Boston, Larry Bailey, Horatio Lamson, Larry Landers, Azel Mack, Archie Morrison, The Pirate, Wally Pike and Bill Smith. We had notes of regret from Orton Camp, Henry Daley, Otto Hilbert, Ken Johnson, Henry Leeb, Bill Spencer, Bur Swain and Jim Tobey. We missed them all—better luck next time! **Ralph Hart** is still laid up so we signed and mailed a note to him with good cheer for a speedy and complete recovery. We missed him. A generous and anonymous classmate treated us to wine with dinner—very nice and many thanks to him. The post-prandial meeting in our upstairs room was as pleasant as ever. **Dick Bailey** has slowed down on his awful stories—no wonder at the end of all these years entertaining us after the dinner. It was a gay, interesting and relaxing evening,

typical of the wonderful friendships that have kept us together all these years and makes our Class so outstanding. For us from Boston it's a yearly celebration—the train ride over and back, the comfortable Chemists' Club, the evening with classmates and Saturday morning in New York.

**Gil Peakes** wrote later: "Our party Friday was lots of fun and I hate to think that some day they will come to an end. I shall try to hang on to the end, and hope that you will be there hanging on with me." We all want to hang on as long as possible.

**Mary Plummer Rice** wrote on my Bronze Beaver award: "I was thrilled that you have been honored by the Alumni Association—you so deserve it." Thank you very much, Mary. At this writing I am looking forward to the pleasure of seeing Mary at our reunion.

**Bur Swain**, addressing us as "You all" writes he is learning down south. And then, looking ahead, he says: "Just now I am thinking about the 60th reunion. We will make it just as good as all the previous ones. Please do not work too hard on this one. I know you and the Pirate always put on a good time for all and that means work. Good health to you all."

Poor **Louie Zepfner**, there doesn't seem to be anything else that he could have wrong with him. We wish him well and do hope he can cross out some of those disabilities. "I very much regret that I will not attend the reunion. I have learned that I now have diabetes in addition to my other infirmities. This, of course is being controlled by diet and drugs. This would preclude my enjoyment of some of the good old seafood. My disintegrated hip hinders my physical motions. I am also under drugs for controlling high blood pressure, gout, arthritis and chronic bronchitis—in other words I am a traveling drug store. We plan to go to our place in Minnesota in May for the summer. Here's hoping for a fine reunion."

**Larry Bailey** has been in a Cape Cod Hospital for serious surgery. As soon as permissible some of us will be down to see him. He was in fine shape to enjoy the New York trip in April.

This series of letters from **Ernie Loveland**, out in the South Pacific shows that he finally had to give up. But we all admire the determination he has shown. "So far there has been no year-end letter, for two reasons: (1) Have had no exciting or interesting travels. When well enough, I worked at Zamboanga; (2) I have had a very unfortunate year healthwise. Actually I am in the hospital now, having been hospitalized except for 10 days at the year's end, since October 18. About eight months ago I went to Honolulu for another spinal operation. The surgeon removed the anterior projections from 3 neck vertebrae and then went inside the spinal column and

separated the vertebral ligament from the spinal cord in 3 different places—a very delicate operation, but he is reputed to be the best spinal surgeon in the world. Spent six weeks in the hospital during which I had to learn to walk again. I also was given exercises twice a day in physiotherapy, finally working up to three different leg exercises with 3 lb. weights tied to each ankle plus arm exercise with 4 lb iron dumbbells. Did 65 leg exercises, then 100 arm, and then repeated that routine for a total of 10 times (650 leg, 1000 arm). So I had my strength pretty well back. After six weeks in the hospital I was discharged. I went directly from hospital to airport, took Manila plane and after about a week in my friend's house (Alvarez), went down to Zamboanga where I went to work immediately. My walking was still rather poor, but after a while I had worked up to a normal gait and was walking each late afternoon, after work, the 2 miles to the hotel. Also doing all the exercises, the full routine, before getting up in morning and before going to sleep at night. Then after some weeks I began to bleed internally from a stomach ulcer—no pain. I became more exhausted each day. And had to give up my exercises and the long walks. Finally on October 18 I decided to go to the hospital and tell the doctor there, that something was very wrong. But first I went to the office at 11 a.m. I was so exhausted that I could no longer continue my calculations. Left the office, feeling OK except for my exhaustion and took a jeepney. The bouncy ride soon had me feeling rotten, and when it stopped just outside the shop, I could hardly walk the few yards to and into the shop. The next I knew they were lifting me out at Brent Hospital and placing me on a litter attended by a doctor and nurses who had been summoned. Up to a room where they went to work on me. Although I had been assured after all previous physical examinations that my heart would never give me any difficulty, this sure looked like a heart attack. During the next 12 days I was only semi-conscious. Just as I had failed to recognize the previous symptoms of my bleeding ulcer I failed to report still plainer symptoms. The hospital's electrocardiograph was broken, but two days after my arrival they were able to borrow another and found the heart action to be entirely normal.

On the day that I was brought in my blood pressure was down to 70 over 50. They now realized that the old pump was OK but there was not much left for it to pump. I guess I had nearly bled to death internally. So in addition to the intravenous dextrose feeding, they started blood transfusions, until they ran out of my type in Zamboanga. They believed there were better facilities for my treatment at St. Luke's Hospital in Quezon City, a suburb of Manila. So believing I was sufficiently built to stand the trip, on November 1, they loaded me, still in my hospital pajamas onto a litter and into the ambulance and to the airport, with a bottle of dextrose still feed-



ing into my arm. There a commercial flight for Manila was waiting for me.

"After another 12 days, of which I remember practically nothing, it was judged that I then could undergo an operation. All of my gall bladder and two-thirds of my stomach were removed. Because of my already weakened condition, it took me a long time to recover from the operation. I was not discharged until just before Christmas and then went to the house of my friend Alvarez. But I was not through with the hospital. Back in Zamboanga I had been cognizant of a slight tenderness under my left breast, but the doctor there had said it was unimportant (with which I did not fully agree). In the meantime a small lump had formed. But it was too soon after the big operation to operate again. It was correctly diagnosed as a benign ulcer. But after New Year's I went back to the hospital. Was scheduled to report late Friday p.m. for a Saturday a.m. operation. Fortunately on Friday noon I discovered a swelling on my lower right abdomen which as far as I know had not been there until that very day. So I went into the hospital a little earlier that afternoon and reported to the surgeon before going to my room. He examined it and reported a small hernia. . . . Minor operations, but in the condition I was in it took a long time to recover. And then about 4 weeks ago I came down, here in the hospital(!), with infectious hepatitis and the accompanying jaundice. The surgeon could not understand how I picked that up in the hospital. It was too long after my latest blood transfusion to blame it on any blood donor. No one else here has it, and all injection needles are carefully sterilized before use. Actually this is a very well run hospital. In addition I have severe arthritic pains in my right hip that makes walking very painful. But the hepatitis has made me feel lousy, and I still have it, although showing some slight improvement. So I don't know when I shall get out of the hospital. I have work to finish at Zamboanga which will take at least 6 months to complete after I have started it. If I can get back into the condition I was in before my Zamboanga collapse I would like, on finishing my work in the Philippines, to try to get to New Caledonia in the South Pacific. Then back to Singapore where I would like to again review my French at the Alliance Francaise. Then perhaps down to Bali in Indonesia before starting westward by boat seeing something of the rest of Africa, although the political situation there is such that I cannot go up the Nile as I had planned some years ago. On reaching Europe I had planned to buy a Volkswagen in Germany to replace my old Dauphine which the Indian government stole from me. Then down to see my friends in Spain before coming back to the states." Following this letter he wrote around the first of March to Bee and Charlie Norton: "I believe I am now recovering and that I shall be discharged within no more than a month more. As soon as I recover my strength I shall proceed to Zamboanga

and start a new phase of the work there which I should finish in about 6 months. I think I am on the right track there. Then if I have got my strength back I expect to start for home by a very round-about route. To add to my misery, the arthritis which was giving me some trouble in Zamboanga has become much worse since I have been hospitalized. I cannot walk usually without cursing and groaning from pain but I am walking farther each day and hope that my hip joint will wear in. But I sure am trying to regain the strength which I lost by being absolutely bed ridden for more than a month. My best to both of you, and I hope that some day I may pop over to Vineyard Haven to see you—and up to Boston to attend some 1915 reunions." Finally this letter arrived. "I have given up. Although some time ago I could walk in spite of the arthritic pain, it has now become so bad that I can walk only a few steps. I have, much to my regret, decided that I must do as the head surgeon at the hospital has recommended all along: Go to New York and from there go to the Arthritic Foundation in New York City and see what they can do for me. Maybe nothing. If so I had better have my left leg cut off and use crutches. Every step now hurts! Actually it has become so bad that I would be unable to walk to the plane or climb the steps up to it. But the head doctor at St. Luke's Hospital has told me that, as I had hoped, he can give me temporary emergency relief for several days and will do so for my trip back to the States. My plans after New York? Absolutely indefinite." We hope somehow Ernie will return for the reunion and will work out some way to be with us for we'd all be happy to see him again.

It's sad to report that **M. Eben Hill** died April 15, 1967 in Hartford and **Gardiner C. Wilson** died April 16, 1970 in Lancaster, Pa. The sympathy of our Class goes to the families of these men.

Here endeth our column for this year, with friendly wishes for you all with your families to enjoy a healthy and happy summer and my profound thanks for all you have done to "help Azel."—**Azel W. Mack**, Class Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

## 16

Now that the 54th reunion is over we'll be planning for the big 55th next year, wondering how in the world it ever came around so fast. Our report of the 54th will appear in the first issue next fall. Some of the absences were predicted in the returned post cards received. For example, Sylvia and **Vert Young** were going to Africa in June. Beatrice and **Walt Binger** were flying to Europe June 9, to be away about six weeks. **Rudi Gruber** said he would be in Lindau, thinking of us that weekend. Mildred and **Frank Holmes** were flying to London on June 8. **Frank Bucknam** would be too busy watering his lawn in

Auburn, Calif., for "there is no rain here from May to September." All told about 40 were expected at Chatham Bars Inn on Cape Cod for this interim 54th reunion at the time of this reporting.

### It's a Small World

How often we have reminders that "it's a small world." Two of them have come to our attention in the last month or so—probably you could furnish many more. Last month we reported the travels of Mildred and **Art Shuey** in the Pacific, in New Zealand and in Australia. Art's small world item relates to "the last friends we spent a weekend with in Australia" where he learned that the daughter of their hosts and her young family were now living in Mountain Lakes, N.J., where your secretary (and other '16ers Elsa Mueser and Harold Mills) are located. We are pleased to report that, at this time, we have already met the daughter, and 14-month old son, Jonathan, and expect to meet her husband shortly.

The second "small world" item comes from **Nat Warsaw** of Randolph, Mass., who reports writing to Kozak Auto Drywash, Inc. in Batavia, N.Y., only to get a reply that started like this: "This letter is from an M.I.T. 1915 Electrochemistry Chemist, 1917 Engineering Doctorate, to show how small the world is and he thanks you very much for your order shipped April 8th." Then, after discussion of a proposal by Nat, the letter ends: "You'd be surprised how many M.I.T. grads identify themselves and if I am around, their letters get routed to me. Best of everything, old-timer." Nat adds: "I've been using their wipers for almost 20 years and had no idea an M.I.T. man was behind it." Nat also sends us a clipping from the April 30 issue of the *Boston Herald Traveler*, a copy of the column "Medicare Mailbox" by Wendell Coltin, that reproduces a letter sent in by Nat regarding the American Association of Retired Persons (AARP). Nat says **Tom McSweeney** introduced him to AARP about three years ago, and he felt that this item might be of interest to our classmates who "do not know about this powerful national organization with about 85,000 members in Massachusetts, about 179,000 in New England and almost 2,000,000 in the U.S." In the published letter, Nat says in part: "For a mere \$2 a year, an elderly couple are buying the biggest bargain they will ever get. In addition, they receive one of the finest magazines it has been my pleasure to read. But that is only a fraction of the value of AARP to senior citizens and their immediate family. In fact, their children derive the most from this group whether they realize it or not. Probably AARP has had more influence in the passage of laws helpful to the aged than any other group, but in addition, they accomplish their goals in a legal and orderly fashion—no demonstrations—no violence. It is the American way! Every senior citizen should belong to this organization—the \$2 takes care of both the man and his wife." We recall that

Wesley Blank, when he passed on last year, was president of the Charlottesville-Albemarle chapter of the AARP in Virginia.

**Frank Hastie** mentions a letter he recently received from J. H. (Jimmy) Murdough, which he says brought back some old memories. Says Frank: "He remembers after some 55 years an action on my part which seemed only natural to me at the time and still does. As Li'l Abner says, 'Any 100 percent red-blooded American boy would have done the same,' and I never thought of it again. It seems we were out on hare and hounds, building up our wind and legs for cross-country and good old Jimmy suffered an impairment of his leg muscles and was slowed to a walk. He says dusk was falling and everyone else left him for the home stable except L.O.F. After all, I couldn't leave a pal to trudge in alone, could I? But his remembering it after 55 years—boy!" We guess that's the kind of thing that most of us remember about Frank!

#### From Retirement Centers

Word from **Bert Ellis** indicates that he and Mary are living a quiet life in Leisure World, Silver Springs, Md., and like all of us, they say, feel their age "at times." He plays nine holes of golf most every other day when weather permits and is on "several committees pertaining to the management of the community. We also read extensively and I am deeply involved in my genealogy studies. About June 1, we are planning to visit our son in Bloomfield Hills, Mich., to see our oldest granddaughter graduate from high school. Then, health permitting, we may visit our daughter (the professor) in Wellesley, Mass., and if we can arrange it, I may drop in on you at Chatham but can't say for sure yet."

From Leisure Village in Lakewood, N.J., we have word from **Harry Smith** who notes, that because of Dot's illness, they are now really "retired." Says he: "Much spare time is conducive to reflection, which brings to mind many things that happened in past years. And, of course, such a review inevitably focuses on the 'boners' one has committed and, along with a certain amount

of useless regret, makes one wonder if and how things would have come out better had different courses been followed at various junctures along the way. No answer, except a feeling—almost certain—that one could have done better."

Irv and **Kay McDaniel** in Leisure World, Laguna Hills, Calif., regret they were unable to get to the class meeting and reunion this time, and to get to the graduation of their grandson from the Naval Academy (especially as Irv is Capt. I.B.M. USN ret'd). They apparently enjoy their new home and have often indicated a number of its advantages—TV from every Los Angeles station, from San Diego, one that is "solely stock market" as well as their own Laguna Hills station. There are duplicate bridge sessions morning, afternoon and night seven days a week. Too, they have one of the best 18-hole golf courses in that general area. And if one wants to learn—Irv has indicated a terrific range of possible subjects: Russian, French, Spanish, "any type or media in art, or ceramics, lip-reading, lapidary, travel, organ, workshops, knitting, culinary kats, tailoring, oral expression, choral, jewelry, braille, theatre guild, etc., etc., etc."

#### New-England-and-Elsewhere Bits

Through the kindness of Orton Camp, '15, and his supply of pertinent information, our Class was able to add our bit of congratulations and best wishes to those of many others on the occasion of the 50th wedding anniversary of Di and **Gene Lucas** in Watertown, Conn., on May 23. . . . And speaking of "golden" events, **Free Clarkson** in Bradenton Beach, Fla., tells of two events that had to be cancelled because of his or his wife's illness—a planned trip to the Orient and their planned Golden Wedding anniversary party in Maryland on May 15. We trust both will be but slightly deferred.

**Shatswell Ober** in Arlington writes that the turmoil at M.I.T. is well reported in the *Review*. Says: "My only addition is that so far only very slight disturbance of classes and research has occurred. Outside of M.I.T. my present affliction is how to dispose of bushels of oak and

maple leaves that cannot be burned—pollution and all that." We too in our spread-out borough in New Jersey, have had warnings that, in the not too distant future, our raked leaves may have to be bagged and toted away, that burning of leaves may fall in the category of a pollution no-no. Our personal records of leaf-raking quantities over the past 12 months show a total of 95 "sheet-loads" last fall and 52 more this spring. Considering the size of my special large sheet and the size of the plastic bags sold for this purpose, and estimating two plastic bags to a sheet-load, that's a total of 294 bags of leaves to be dragged to the curb. It all makes you wonder whether, in the wide open spaces of good zoning in hilly borough terrain, such regulations will be really necessary!

We have for display at the reunion a reprint of a pencil rendering titled "Boston 1969" by **Izzy Richmond**, used by Grefco, Inc., of Los Angeles, in their advertising campaign featuring renderings of major American cities by notable architectural delineators. Izzy was chosen to do the pencil rendering of Boston, which was used in the February advertisement to readers of *Architectural Record*, *Progressive Architecture*, *Journal of the American Institute of Architects* and other professional magazines. We all appreciate very much receiving a copy of another fine piece of work by Izzy—his sketches and renderings are really something to rave about—say we!

**Allen Giles** provides us with an item of real local interest in Melrose—a clipping from the *Melrose Free Press* announcing his marriage to Mrs. Mertie L. Winchester of Clinton, Conn., in a double ring ceremony at the First Congregational Church Chapel in Madison, Conn. As Allen says: "She was the widow of a former engineer associate of mine in 1925, and we have continued our mutual friendship of the two couples throughout the intervening time to the present. As you will notice, we are leaving for Bermuda shortly and hope to get to the 54th reunion in Chatham."

**Phil Baker** of Grosse Pointe Shores, Mich., explained in early May that he is



not too busy, was in Florida with his daughter and son-in-law for a fancy and swanky ocean beach two weeks at the year-end vacation time and returned home to find it five and ten degrees below zero. This shocked him into a short stay in the hospital but he's now quite recovered. He has since been on a cruise to South America and was looking forward to the Metropolitan Opera coming to his area, when he would get out the old silk hat if he was sure his wouldn't be the only one. And too, he would sure enough be at the reunion—good news indeed, to all the old timers!

From almost next door, in Birmingham, Mich., comes the bright message from Gyps and **Cy Guething**, that they'll be there—at the 54th (with bells on, may we add—Secs.). As they wrote late in April, Cy was expounding on the beauties of spring in his back yard: "The spring flowers are really bursting out and it is beautiful. The lawns and gardens are all in wonderful shape. Will start painting which keeps me as busy as desired. We plan to be at Chatham June 11th to Monday the 15th. Hope you and Grace make a long stay of it so we can have a repeat. We then plan to return to our old stamping ground, Boothbay Harbor, Maine. But we must return here for our granddaughter's wedding July 25."

**Tom Atchison** is "enjoying the good life" in Princeton, N.J., and is active with two hobbies, "figure skating and genealogy research (the latter about completed with seven generations here in the U.S.A., soon perhaps to be put in book form). Anticipate a cross-country trip to Arizona. Daughter Shirley is a delegate to the national meeting in D.C. of the League of Women Voters, from her home in Kearney, Neb. Grandson Tom is a freshman at New College in Sarasota, Fla. Granddaughter Barbara is a freshman at Hastings College, Hastings, Neb. Four-year-old granddaughter Carol was in a figure skating carnival in Edina, Minn. Seven other granddaughters and one other grandson are thriving in various activities, growing too fast to keep up with."

We have a fine letter from Colonel **Walter Wolfe** of Bradenton, Fla., ex-

pressing real concern over the vandalism at M.I.T. and giving some sage advice on what really should be done about it. More grist for the mill at the class meeting during the reunion at Chatham in June!

We are very sorry to report the death of one of our old reliables, **Bill Leach**, in Austin, Texas, May 8, following a sudden illness and hospitalization for several weeks. Before he came to Tech and the class of 1916, he had gone to the University of Chicago where he earned not only a B.S. but considerable fame in football as an All American guard under Alonzo Stagg. In World War I he served as a Major in chemical warfare. Then, as a Course X chemical engineer, he held for years a head management position with the Matheson Alkali works in Niagara, Falls, N.Y. In 1942, he and Helen left Niagara Falls for Austin, Texas, where he designed and headed, for the International Minerals and Chemical Corporation, the magnesium plant which we understand is now known as Balcones Research. Later, and for many years, Bill was active as a consulting engineer in his chosen field. In our class histories for the 50th reunion, Bill replied as follows to the question: What in your professional career gave you the most satisfaction: "Dealing with men; mainly the employees under my charge. Development of electro-chemical processes and equipment. Travel. A wonderful wife." As reported in an Austin paper, he was a member of the University Presbyterian Church, and Knights Templars of Niagara Falls. Survivors include his widow Mrs. Helen Phelps Leach of Austin; and a niece, Mrs. Sheldon Varzwoll of Denver, Colo. We'll miss Bill for himself and as a member of our Advisory Council.

At the May 1916-1917 class luncheon in New York, the numbers were equally divided with Walt Binger, Mac McCarthy, Herb Mendelson and Peb Stone for 1916 and Bill Hunter, Dick Loengard, Bill Neuberg and Clarence Seely for 1917. These luncheons will start up again in September at the Chemists' Club, 52 East 41 St. near Grand Central—at noon, each month on the Thursday following the first Monday of the month. If you would like to receive regular

notification of the monthly luncheons, just drop a card to Peb Stone (Assistant Secretary of 1916). If you are planning a trip to New York, try to make it coincide with one of these monthly dates. Julius Stratton was with us for two of the first five luncheons in 1970 and we expect he'll be with us again.

And now we close down the column for the summer with all good wishes for a pleasant and healthful vacation wherever it is that you plan to be. Keep your little old secretaries busy by writing a little but writing often—news, commentaries, bits of philosophy, or bundles of seasoned common-sense for use in the early issues of the *Review* next fall.—**Harold F. Dodge**, Secretary, 96 Briarcliff Rd., Mountain Lakes, N.J. 07046; and **Leonard Stone**, Assistant Secretary, 34-16 85th St., Jackson Heights, N.Y. 11372

## 17

It may be recalled that the notes of two years ago last fall told of the grandson of **P. Y. Hu** who entered the Institute at that time. In spite of good intentions I had not seen Chi Kuan Wu since that October. He then was adjusting to our strange ways and speaking amazingly good English for a person who less than a year previously had spoken no English at all. Now he is finishing his junior year and is well adjusted and happy. First I asked for his grandfather and learned that he has left Kuala Lumpur, Malaysia for Singapore the reason being the amount of racial strife as the Chinese are a minority group. P.Y. is among friends in Singapore and is well. When I talked with Chi Kuan as he entered his freshman year he thought he would study aeronautics. He has changed, though, to mechanical engineering feeling that it would be a more general training for his future wherever that might be. He thinks that he would like to go on for a doctorate after possibly working for two or three years. He would like to have a business career rather than engineering although teaching might attract him. There is now a demand for mechanical engineering teachers in the far east. I was curious as to his reactions to the disruptive campus activities of this past year. The expression on his face along



with his comment that disruptive students were naive really gave his feelings.

He feels that these trouble-making people would do well if they could be made to realize how fortunate they are compared with students in most other countries. He emphasized that the trouble-makers at M.I.T. are a small minority. Chi Kuan lives in Burton House and will move to the fine, new MacGregor House next fall. He has not much time for extra-curricular activities but does play on the house ping-pong teams. It was a pleasant, refreshing visit. His industry, point of view and adaptability are to be admired and I look forward to further visits with him.

**Bob Erb's** wife is now *Councilwoman* Pat Erb. In the New Canaan, Conn. election last April Pat was elected by the largest number of votes of any Democratic candidate. Husband Bob is duly impressed and report has it that only Pat's innate good sense prevented him from taking television time at a prime hour to announce it.

It is pleasant to have a note from Mrs. Worthen Proctor expressing appreciation for her copies of the *Review* and also that the Rodgers Building painting had not been injured. The *Review* is being sent regularly to about sixty class widows.

By the time this is read a dinner for **Jim Flaherty** will have been held at the Faculty Club in recognition of Jim's support of class activities and also the display of sixteen of his watercolors held at the same time in the Club for the month of June. . . . **Dick Loengard** has taken over from **Dix Proctor** what might be called the job of Sergeant-at-Arms for the monthly luncheon meetings at the Chemists' Club in New York. Although the status of M.I.T. at the Club has changed, the '16-'17 lunches continue, usually on the Thursday of the first full week in the month. **Enos Curtin**, **Bill Hunter**, **Will Neuberg** recently returned from a Portugal-Spain trip, **Ed Seely** and **Dick** attended along with the '16 group. It has been particularly pleasant to have our Honorary Member **Julius Stratton** attend these lunches when his full schedule permits and he was able to take in the April meeting.

We had heard that the **Barney Dodges** traveled both far and wide, so we asked if we could know more of their doings. Barney has kindly complied as follows: "I apologize for the delay in answering your letter of January 13. It arrived just two or three days before Connie and I set out for Iran where we now are and will be until June 1. I am stationed in Shiraz where I am teaching two courses at Pahlair University. We just flew down here today (Abadan-Iran) so I could visit tomorrow what is reputed to be the world's largest oil refinery. This afternoon I have no engagements and I thought it was a good time to answer your letter which, I must admit, Connie has been prodding me to do for some time. So now you are in for it.

"I had to retire from Yale on July 1, 1964 (too old to teach there any more but not too old to teach at various other universities around the world) but I have kept very active professionally and have done a lot of traveling. In May 1965 we went to Europe and it was at Opatiza in Yugoslavia that our baggage was stolen from our car. I had forgotten that the baggage compartment did not lock automatically. We lost almost all of our luggage. Fortunately our money, passports and my camera were in the hotel with us. As you can imagine this theft nearly ended our trip but we went on and had an enjoyable trip in spite of it. In June we attended a joint meeting of the American Institute of Chemical Engineers and the British counterpart, in London.

"In July 1966 I was off to Argentina where I taught for six months at the University of Buenos Aires (in Spanish) and gave lectures at various other universities in the country. This was just ahead of the take-over of the government by a military coup and all the subsequent turmoil and violence at the U of B.A.

"In the following year I was commissioned by the Society of Sigma Xi to go on a lecture tour in South America and gave a total of 9 lectures in Brazil, Argentina, Uruguay, Chile and Peru and also visited Paraguay, Ecuador, Columbia, Venezuela and Bolivia. Incidentally, I had taught in Caracas, Venezuela some 9 or 10 years earlier and my career there was terminated by a revolution which closed the University. In connection with this Sigma Xi lecture tour, I spent a month giving a concentrated course at the National University in Montevideo. (not much of a mountain to see actually)

"My next tour of duty was at the University of Maryland where I gave two graduate courses for a term and commuted each weekend to New Haven. Almost immediately after finishing at Maryland Constance and I set out for Australia where I taught for a term at the University of New South Wales. On the way we stopped in Japan where we spent most of the time in Kyoto visiting a Japanese friend who is a professor at the University of Kyoto. This was mostly fun and little work, though I did give two informal seminars.

"From Australia (which we enjoyed immensely) we went on around the world visiting Hong Kong, Thailand, Cambodia, India and New Zealand, stopping for a while in France and Spain before returning home. We were gone, about six months in all. Having taught in both France and Spain when on sabbatical leave from Yale, we usually visit friends we have made in those countries, especially in Barcelona.

"In the fall of 1968 we again went to Europe, combining business with pleasure. Through an exchange arrangement between the U.S. National Academy of Science and its Yugoslav counterpart I gave lectures at several centers in Yugo-

slavia during the period of a month, after and before we did a little touring in Europe. Incidentally we have been to Yugoslavia four times and are quite enthusiastic about the country in spite of our one unfortunate experience.

"Last spring I attended an Inter American Congress in Buenos Aires and then spent three weeks in Bahia Blanca, Argentina giving a concentrated course in chemical engineering at the University.

In the fall we went on a three-week safari in East Africa visiting the national parks and wild animal reserves of Kenya, Uganda and Tanzania. We both agreed that it was one of the most enjoyable trips we had ever taken.

"Just a few days before leaving for Iran I spent a week skiing in Jackson Hole, Wyoming with my son-in-law and a friend. For the past 16 years I have gone to Vermont several times every winter for skiing. When in New Haven (Oh, yes I do spend some time there) I am at the office all day every day (the University allows retired Profs to retain an office if they can show that they make good use of it) even including Saturday. For exercise I do figure skating at the Yale rink at noon and Connie and I play tennis frequently in the summer. You may wonder what I go to the office for. I still do a little consulting and spend a lot of time writing papers for technical journals and am working on a book. While here in Iran we went off for a week in Afghanistan—a most interesting country; we hope to return some time. The peripatetics of the Dodges are about concluded, that is, the relation of them, not necessarily the wanderings themselves. I figured that this might be the last time I would go off to teach in some corner of the world but who knows? After I have been home for some months the wanderlust may seize me again and very likely I will be off spreading the gospel in some corner of the world. I counted up the other day and found I had visited 50 countries of the world. I have no fixed goal in numbers but we met a couple in our travels whose ambition was to visit all the 'visitable' countries of the world and 100 were already behind them. Not for me."

We are sorry to report that **A. Edward Tuttle** died on May 14, after a long illness, at Keene, N.H. Services were held at Mt. Auburn Cemetery in Cambridge which Al Lunn was able to attend. Regrettably the deaths are recorded of **Stuart W. Gurney** on May 3, **Kenneth M. Childs** on June 4, **Maurice L. Hodgson** and **Charles E. Richardson**.

Northfield Inn, Northfield, Mass., is the choice for our 53rd reunion. The location and facilities proved most satisfactory last year so we have reservations for October 6-7, Tuesday and Wednesday. The foliage will be at its peak at that time and another good crowd is anticipated. Mark your calendar now and look for details coming from Dud Bell.—**Stanley C. Dunning**, Secretary, 6 Jason St., Arlington, Mass. 02174

As I write these notes it is less than ten days to Alumni Day, 1970. Some of us, too few in number, will attend. Many of you want to come, but for various reasons fail to make it, and hopefully resolve to be here next year. Make this resolution a must for 1971. I believe this terribly important. It is my experience that the renewal again of undergraduate friendship and acquaintance somehow brings us closer with a warmth that is indeed most pleasant. At the same time a visit to Cambridge permits you to see how Tech has grown in over fifty years since you became Alumni. It is doing a magnificent and imaginative job in educating our people in science and technology, many of whom will be leaders in industry, research, teaching, and government in the next decades. Not only will you be impressed with the physical plant but also in the scope of the program—applying M.I.T. know-how to the problems of public health, pollution, the urban crisis, poverty, government and many other new disciplines such as oceanography.

Many voices are heard from the student body, faculty, and administration, including those of a minority of student and raucous militants. The Alumni, the largest group in the M.I.T. family, have been restrained. I invite you through these columns—and in person, particularly, on Alumni Day—to voice your ideas as loyal yet concerned alumni.

If there is a dearth of news for this issue of class notes it is because you haven't sent it to me! I invite, nay, urge you to do your bit—write me—for the next and succeeding months. I love letters!

I was happy to see **Harold Weber**, if only for a few minutes, at the M.I.T. Faculty Club. He is busy as usual; spends some time in a consulting capacity for a Chicago oil company, dividing the remaining time between the Institute, his country home in New Hampshire, and his city apartment in the Prudential Center in Boston. . . . The **Julian Howes** opened their home (a "first" by Royal Barry Wills in Wellesley) in May for a Garden Club tour. It was the only do-it-yourself garden to be visited; 600 ticket holders were charmed by the visible results of the loving care lavished by Elizabeth and Julie on well-chosen plant material in just the right spot. . . . Stella and **Al Grossman** left May 30 for a two-week visit to Bermuda. Hopefully, they will return in time for the Alumni Day luncheon with the latest gossip of this island.

Dorothy and **Clarence Fuller** were our hosts at their home in Foxboro recently. We saw there another example of a Bill Wills house, and this with an interesting twist. Bill first built them a house in Scarsdale, N.Y., some years ago, which they found so much to their liking that they had him duplicate it when they moved to Foxboro, Mass. . . . The **Ed Rossmans** are back in Paris Hill, Maine

and we spoke recently with both Dorothy and Ed. They had had a fine winter in Arizona and California. Unfortunately the oil burner in the Paris Hill house caught fire during the winter so right now they are cleaning up all the soot and damage; hopefully things are back to normal now. We look forward to seeing them at Alumni Day. . . . Among the news notes in the *New York Times* of April 7 is one concerning the advisory committee of the Arms Control and Disarmament Commission appointed by President Nixon and the U.S. Senate. **Bill Foster** serves on this group which is advising a moratorium on the missile race with the Soviets.

Your secretary was very happy that he visited **Henry Berliner** as reported to you previously, on Washington's birthday last. With sorrow I reprint the news of his passing from the *Washington Post* April 3, 1970. Our condolences go to Mrs. Berliner. "Henry A. Berliner, Sr., a pioneer in aircraft construction in this country and former president of an engineering firm here, died April 3, 1970, after a heart attack at his home, 2841 Tilden St., N.W. Mr. Berliner was born in Washington and was educated at McKinley Technical High School and at M.I.T.

"He was a veteran of both world wars, serving as a fighter pilot in the Air Force and attaining the rank of colonel. Mr. Berliner was the son of Emile Berliner, the inventor of the telephone mouthpiece, the phonograph disc and numerous aviation devices. With his father, Mr. Berliner built and flew one of the first helicopters during the 1920's. From 1930 until 1954, Mr. Berliner was chairman of the board of Engineering and Research Corp. (ERCO), an engineering research and aircraft construction plant in Riverdale, Md.

"He sold the business in 1955 to ACF Industries and became president of Tecfab, Inc., a concrete products firm. The sale of ERCO led to a landmark District tax case, in which Berliner and his wife were forced to pay income tax on the profit they had made in operating ERCO. The U.S. District Court here ruled that income from the liquidation of a business is taxable.

"Mr. Berliner, who retired in 1962, was a member of the Army-Navy, University and National Press Clubs. He is survived by his wife, Josephine; a son, Henry A. Jr., general counsel for the D.C. Republican Central Committee of Washington; two daughters, Mrs. Russell E. Cunningham, of Washington and Mrs. George L. Vargas, of Reno, Nev., and eight grandchildren.

**Mal Baber** is one of my best correspondents. His comments are always pithy and worthy of consideration: "My dear Max: A letter from you is always a welcome surprise. Your interest in the Institute and the way you are keeping us abreast of today's problems are much appreciated; and you and Johnny deserve the gratitude of all of your classmates. Accept my thanks.

"You are also no doubt aware that similar disruptions have occurred at Yale. Unfortunately we lack a Howard Johnson. Outraged by faculty attitude on ROTC several prominent members of my Class wrote requesting modest contributions which were used to present watches to outstanding members of the ROTC units at graduation. The results were striking: more money came in than they knew what to do with, and secondly we received most heartwarming letters from military personnel in command of the units, and even more appreciative letters from the boys themselves. We are now considering continuing this program and even funding it so it will outlast our rapidly diminishing numbers. It occurs to me that it would be worthy of consideration to have our Class institute something of this nature at the Institute. Certainly, today any boy who voluntarily enters ROTC deserves the thanks of those of us who have served and to whom our country is still very precious.

"Incidentally, I received a copy of the press release about the charges of trespass, etc., now pending following the disgraceful desecration of the offices of Johnson and Killian. We are indeed fortunate to have such men at the helm in these days. I hope you will not consider the suggestion from so inconspicuous a member of so distinguished a Class as being presumptuous. With regards to all and especially to your lovely wife. As ever, your classmate Malcolm."

We have news of the death of **Helen Colson** sent to us by her daughter to whom we extend our sincere sympathy. "Dear Mr. Seltzer, Was it months or a year or two ago that you wrote to my mother, Helen B. Colson, who was affiliated with the Class of 1918 at Tech, asking either for news for the *Technology Review* or for notes about her life achievements for class history? I am sorry to tell you that she passed on Christmas morning, 1969. She had pneumonia and a heart problem, a bad combination at almost 94 years of age.

"You ask about her life. She graduated from Radcliffe with a magna cum laude in 1900. She taught in Brattleboro, Vermont, and Nashua, N.H. for a few years. In 1906 she married Harold Roy Colson, an astronomer and photographer. She had one child, me. Father died in 1913. She taught school in Watertown, Mass., for a short time. Then followed stints as a chemist with General Electric in Pittsfield and Arthur D. Little in Cambridge. But school teaching was her real love, and she soon found a spot at Cambridge High and Latin School, which combined with the stints in Brattleboro, Nashua, and Watertown totaled over 35 years in the profession. After her retirement in 1946 she continued to live at 140 Spring Street, Watertown, which was the homestead of the Byron-Colson family from 1899 to 1960. She enjoyed her retirement, doing the feminine things that a career had crowded out during most of her life. Her garden was lovely. She did club and church work. When she became the last



of her generation, she sold the home and came to live with me, first in Longmeadow, Mass., and later in Poughkeepsie.

"Incidentally my husband is M.I.T. Class of 1931. The lovely photograph which you sent Mother of the Class Reunion at the Wianno Club reminded us of our happy reunion there not so long ago. Thank you for sending it to Mother. She treasured it. Ken and I send our best wishes to you for health, happiness, and whatever your heart desires. Sincerely yours, Edith B. Clark."

New addresses include **George E. McLaughlin**, 18 Washington St., Salem, Mass. 01970 and **Edward Rogal**, 19201 Bethany Dr., Irvine Calif. 92664—**Max Seltzer**, Secretary, 60 Longwood Ave., Brookline, Mass.

## 19

**John J. Falkenberg** passed away on April 7, 1970 at 901 Sherman St., Denver, Colo.

**Richard Holmgren** has now practically retired. He has sold his home and is traveling around in an Airstream trailer. He has just returned from a 70-day tour of Mexico in a caravan, hitting Puerto Vallarta, Vera Cruz, Acapulco and Mexico City.

**George A. Inglis** reports his address as 2003 Greenbrier, Clearwater, Fla. 33515. **Frederick L. Hunter** says, "I listen, look, admire M.I.T. and am thankful I attended Tech with the Class of '19. *Technology Review* has become a splendid magazine. I pass it on to friends."

A nice long letter just arrived from **Ed Moody** of Hollis, N.H., who plans to motor to North Carolina this summer to attend the Mountain Folk Festival. Then to attend Folk Dance Week he will travel to the Kentucky Dance Institute at Morehead State College where he is on the staff. Ed has three grandchildren triplets, 17 years old, two boys and a girl. The whole gang, grandfather, father and grandsons are all motor car restorers. They have a 1929 Model A Ford on display at antique car showings and are now working on a 1937 Buick. Ed himself is working on restoring a Citroen. He and his son started with a 1930 Chevrolet, stripped it completely, hot rodded the engine, built the body, hood and fenders of plywood and aluminum, changing it into a sport racer roadster which they got up to 96 miles per hour. His ventures followed in order: a go cart with wooden frame and friction drive powered by 2-cycle one luger 1½ HP engine, then a Czechoslovakian Skoda, then an Austin, then a Metropolitan with an Italian body, English Austin engine and American gear set and rear end. Ed likes the Citroen and thinks it is the finest car he has ever owned. In his spare time Ed repairs Briggs Stratton engines for his neighbors. As he puts it, "the Secretary Emeritus of the New Section of the Society of Auto-



"Backstage" with 50-Year Reunion members of the Class of '20 before the June commencement ceremonies.

motive Engineers and past designers of fire engines is having a 'ball' with gasoline engines." We wish Ed the best in his hobbies and are sure they keep him young.

Your secretary celebrated his 72nd birthday on April 7 with dinner at the Arcade Tap Room with Genevieve and **John Stevens** who have enjoyed their Florida winter. We will spend June and July driving through Chapel Hill, N.C., Washington, D.C. and in Ohio (40 Wintergreen Hill, Painesville, Ohio). Then Chalk River, Ontario, Canada in August and September and October in New York City, Washington, D.C., Chapel Hill, and back here in Delray Beach in November. I hope the Class has a fine summer.—**Eugene R. Smoley**, Secretary, Apt. 11E, 50 East Rd., Delray Beach, Fla., 33444

## 20

Since the closing date for these notes is of necessity well in advance of our 50th I shall have to promise a full report on the Grand Reunion in the next issue.

Your secretary had an opportunity to peruse a condensed biography of our distinguished classmate **Bob Sumwalt** appearing in a volume on South Carolina's citizens of prominence. Bob, who is retired president of the University of South Carolina, holds an honorary Doctor of Science degree from the University of Delaware and an honorary Doctor of Laws degree from Newberry College. He started his notable career in South Carolina way back in 1921 as resident engineer for the State Highway Department, joined the faculty of the university a few years later as Associate Professor of Civil Engineering, then was appointed a full professor, Dean of the College of Engineering and finally President. He was at one time Chairman of the State Planning Board, State Board of Housing and State Board of Engineering Examiners, a member of the Executive Committee of the Southern Regional Education Board and of the State Committee on Nuclear Energy. He is presently Commissioner of the Columbia Housing Authority. Bob is a life

member of the American Society of Civil Engineers and the American Society for Engineering Education.

Among his many honors he was appointed Chairman of the Freedoms Foundation Awards jury at Valley Forge and was named "Engineer of the Year" in South Carolina. The university's College of Engineering now bears his name as do two scholarships and a professorship at the University. Now enjoying his well earned leisure at his lovely home, 733 Sweetbriar Rd., Columbia, S.C., Bob relaxes with golf and music in addition to his duties as Regional Vice President of Freedoms Foundation and director of the South Carolina Society for Crippled Children and Adults. He and his wife, Caroline, are fortunate to have a son and daughter in South Carolina, his son a vice president of McCrory-Sumwalt Construction Co. of Columbia.

Welcome word has been received from **Bill Ellis** of 5 Helen Ave., West Orange, N.J., who is now retired from his job as editorial writer for the *Newark News*. Bob recently participated in a Georgetown University seminar in Caracas, Venezuela. While visiting the new University of Oriente in Cumana, Bob says he was pleased and gratified at a statement by one of the administrators that Oriente's goal was to be made the "M.I.T. of South America," a "worthy aspiration," says Bob whose son-in-law is an M.I.T. graduate and whose grandson is hopefully headed toward the Class of '82.

A note from **Ken Newhall** of 25 Rock Ave., Swampscott, confessed that he has been working on construction jobs about half the time since his retirement from Shepley Bulfinch Richardson & Abbott. He is now clerk of works on the Elderly Housing Project of his home town. Ken remarks "I find leisure time becomes more valuable when one does not have such a surplus of it. With a new house overlooking the Atlantic, a son and daughter and six grandchildren close by, we consider ourselves fortunate." . . . **Clarence H. Sorum**, Professor of Chemistry at the University of Wisconsin resides at 938 University Bay Dr., Madison.



At the close of the Alumni Fund's fiscal year it gave your secretary considerable satisfaction to deliver a substantial contribution in the name of **Elliott Perkins** whose death prevented his attendance at our 45th. This sum was donated to the Class through the courtesy of his widow Edith, formerly of Arlington, Mass., and was turned over to the Fund, with interest, upon the approval of the class officers. I would like very much to communicate with Mrs. Perkins on the occasion of this gift but find that she no longer resides in Arlington. Her daughters are Mrs. Eleanor Bassett of Falmouth and Mrs. Elizabeth MacDonald of Walpole. Elliott was long associated with New England Telephone as an engineer. He was a member of Telephone Pioneers of America and the National Association of Corrosion Engineers. His former address was 35 Addison St., Arlington. Can any one supply me with Mrs. Perkins' address?

Ruth Rouse, widow of **Arthur W. Rouse**, has graciously provided further information about Arthur's career. He started with General Electric and was in charge of the cost department at Taunton and Lynn. He then joined the accounting department of United Drug Co. and later became office manager at Ludlow Manufacturing Co. where he served the town as secretary of the town finance board. He then became assistant treasurer and secretary of the Gray Manufacturing Co. of Hartford and was a member of the board of directors. Prior to his retirement Arthur became affiliated with the Aneomostat Corporation of America in Wethersfield, Conn., as office manager. His widow resides at 40A Sherburne Rd., Wethersfield, where she is senior curator of the Connecticut Society of Colonial Dames. Arthur leaves a son, Richard, a daughter, Mrs. Roger Sherman of Cochituate, Mass., and six grandchildren.

Belated word has been received of the death of Professor **Albion Doe** of 333 Vincelette St., Bridgeport, Conn. No further details are known.

I must also sorrowfully report the death of **Alfred ("Mitt") Hand** of 3415 Woodley Rd., Washington, D.C. Mitt came to Washington, after some years as a chemical engineer in Orange, N.J., to work for the National Recovery Administration. He later became interested in aviation, specializing in international aviation policy for the Civil Aeronautics Administration, later the Federal Aeronautics Administration. He served as U.S. delegate to a number of overseas international aviation conventions and was an organizer of the United Nations aviation section. He is survived by his wife, Elizabeth, a son, a daughter and granddaughter.

The sudden and untimely death of our distinguished and widely known classmate, **Archie Cochran**, has received national notice. Archie was rightfully considered the leading citizen of Louisville, Ky. He had retired as chairman of the board of Anaconda Aluminum Co. He

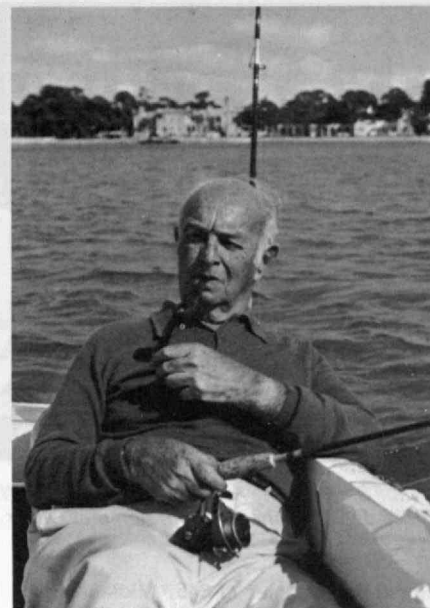
started his long career in the aluminum industry with the U.S. Foil Company, later the Reynolds Metal Co. Later he started his own foil company in Louisville which was eventually acquired by Anaconda.

A tribute to Archie appearing in the local newspaper is worthy of quotation. "Archibald P. Cochran was a man deeply involved in life. Until the very hour of his death he was engaged in tireless and constructive activity. Another man might have devoted such unquenchable energy to the mere pleasures of living, especially after retirement from a highly successful business career. But the pursuit of happiness to Mr. Cochran was the accomplishment of worthwhile projects. He brought to them a zest which never flagged.

"For years he worked on countless civic campaigns. The last years were among the busiest and most productive of his life. They were devoted to such enterprises as the University of Louisville which he served as board chairman in a critical period of transition; to the Riverfront Commission, a dream that might have been impossible without his dauntless optimism and faith; and most recently to an organization he christened Riverfields, Inc., dedicated to the preservation of green, open spaces. Trees were among the lively enthusiasms of his life. Thousands of those he planted will continue to grace the community for many years to come. He planted other seeds, too, that will germinate and flourish far beyond his own life—seeds of civic pride of friendship and vision. Louisville is a better place now, and will be for the years ahead, because of what Archie Cochran gave to it in generous affection." Archie is survived by his widow, Polly, two daughters and four grandchildren. He lived on Stone Bridge Rd., Louisville.

Through the kindness of his widow, Marianne, I have just received sad news of the death of **Bob Rowe**. Bob was a retired Navy Captain. He lived at 4950 Connecticut Ave., N.W., Washington, D.C., served as a lieutenant in the field artillery in World War I, went on to study architecture in Paris, became an accredited architect and chief architect for Montgomery Ward. He was a fellow of the American Society of Civil Engineers and a member of the Arts Club of Washington. I am sure the Class joins me in extending deepest sympathy to Marianne. She writes, "I know that he would want me to send his classmates his good wishes for a jolly Fiftieth Class Reunion."

Word has just reached us of the death of **Arthur Farrington** of 76 Orchard St., Randolph, Mass. After serving in the army air force in World War I, Arthur joined the engineering division of Factory Mutual Insurance Co., retiring as engineering consultant for that company. He is survived by his wife, his daughter, Mrs. Virginia Merigan and two grandchildren. The Class extends sincere sympathy to his family.—**Harold Bugbee**, Secretary, 21 Everell Rd., Winchester, Mass. 01890



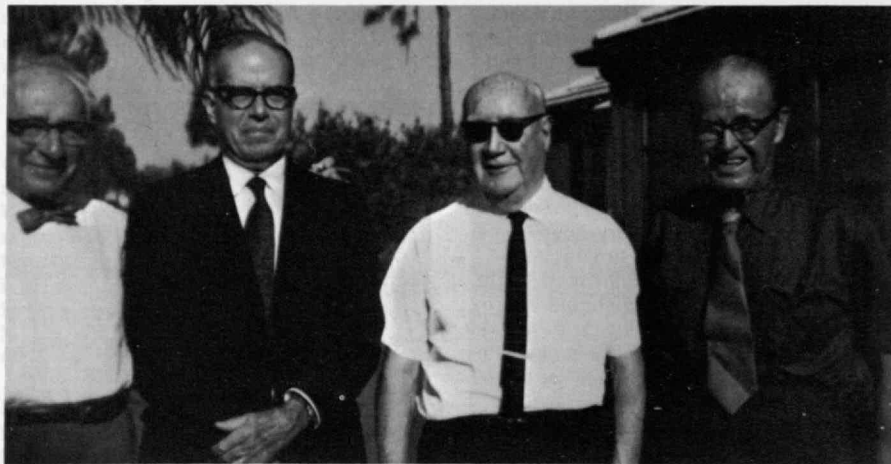
"My favorite occupation," says Richard J. Spitz, '21.

## 21

With this issue, we complete 49 years of recording history made by you and other members of the Class of '21. To help start the 50th properly, write us a news letter now so we can enter messages from everyone on these pages between this issue of the *Review* and that once-in-a-lifetime golden anniversary celebration, less than a year away. By now you have preliminary information on that important event from 50th Reunion Chairman **George A. Chutter** with the revised dates of June 3 through 7, 1971, newly-established because of M.I.T.'s calendar change. You also have a '21 Class Directory and sheets of the special '21 reunion stationery for your use in writing to urge your friends to meet you and your wife in Cambridge next June. When you write that note to your secretaries, don't fail to complete, tear out and enclose the personal data sheet bound into the back of the Class Directory. It is a necessity for M.I.T. and Class records. It's return is the best way you can tell us that you appreciate our efforts and want to aid us to continue. Please write at once—and send back the data sheet!

### P-leisure bound

**Clayton C. Westland**, retired vice president and director of McCall Corp., New York City, says he has a new home at 50 Popham Rd., Apt. F2, Scarsdale, N.Y. 10583. . . . Mildred and **William B. McGorum** have moved from Virginia to retirement quarters in Florida, where they can be reached via Box 401, Flagler Beach 32036. . . . **Richard W. Smith** has retired from the U.S. Chamber of Commerce, Washington, and lives at 8713 Jones Mill Rd., Chevy Chase, Md. . . . **Eugene W. Rudow** is one of the regular "commuters" who has left his Palm Desert, Calif., winter home to



Victor S. Phaneuf, Antonio H. Rodríguez, William C. Ready, Philip R. Payson (all Class of '21) at the Phaneuf home at Oliver L. Bardes' Bardmoor Country Club, Largo, Fla.

spend the summer at 8457 Midland Rd., Bellevue, Wash. 98004. . . . Florida residents returning north are Ann and **George Schnitzler** to 32 Gerry Rd., Chestnut Hill, Mass. 02167, and Edna and **Philip T. Coffin** to 344 Jefferson Dr., Pittsburgh, Pa. 15228. . . . At his last report, **Harry M. Ramsay**, then located at 10830 Venturi Drive, Sun City, Ariz. 85351, wrote: "We will be returning to California in the next 60 to 90 days—address as yet unknown. Reason: Allergies, supposedly from airborne agricultural chemicals! Spent some time recently with (George) Roger McNear, '20 and (Dean) Kingman Webster, Jr., '19." Please send that new address, Harry, so we can revise the Class Directory.

#### Viva voce

It has been a long time since we have talked with **G. Whittier Spaulding** and it was a most pleasant surprise to have a phone call from him from his home, 3402 Highland St., Allentown, Pa. 18104. Whit says he and Elizabeth will be at the 50th. They spend about four months a year at their home in Boothbay Harbor, Maine. Whit keeps in touch with several Course VI men whom we haven't heard from in a long time—William C. Kohl, Henry M. Lane and Charles E. Thornton. He also inquired about **Harry P. Field**, since he hadn't been able to see Harry during a stop in Hawaii some time ago. Retired in 1964 as vice president of Pennsylvania Power and Light Co., Whit had previously been president of Pennsylvania Water and Power Co. The Spauldings have two married daughters and seven grandchildren.

**Emma and Leon A. Lloyd**, 35 Spruce St., Westerly, R.I. 02891, phoned during a visit to their daughter in New York City to inquire the name of the Cambridge hotel in which the (later canceled) Class dinner had been scheduled during last month's Homecoming. Al, in company with a number of others from '21, had been at M.I.T. in the interest of swelling the Class 50-Year Gift, and couldn't find the stated hotel which, it seems, has been renamed.

Another call from Marge and **Jackson W. Kendall**, 401 Hermosa Pl., South Pasadena, Calif. 91030, was occasioned by his anxiety in not being able to reach Class Prexy **Raymond A. St. Laurent** at the latter's home, 47 Gerard St., Manchester, Conn. 06040. Ray had phoned us earlier that he and Helen planned a brief trip to Center Lovell, Maine. . . . Helpful calls from George A. Chutter, Edwin T. Steffian and Sumner Hayward have detailed M.I.T. reunion and class matters. Chutt tells us that **A. Royal Wood** has volunteered to handle secretarial and treasury duties for the 50th reunion. Betty and Sumner are celebrating the arrival to their daughter, Priscilla, and her husband, Joseph Crago, of the first Hayward grandchild, Marcelle Crago, on May 26, 1970.

#### Welcome letters

"You may be interested to know that Marion and I attended the picnic of the M.I.T. Club of Southwest Florida," writes **Philip R. Payson**, 5031 Northampton Drive, Tanglewood, Fort Myers, Fla. 33901. Phil continues: "You mentioned **Oliver L. Bardes'** condominium community, the Bardmoor Country Club, Largo, Fla. **Victor S. Phaneuf**, who lives there, invited Marion and me for cocktails before the dinner of the M.I.T. Club of Central Florida. Also present at Muriel and Vic's beautiful new home were Marty and Bill Ready of Clearwater and Graciela and Helier Rodríguez of Tampa. All of us attended the dinner, where we met these others of the Class of '21: Pat and Allen Addicks, Tom Bartram, Elmer Campbell, Claudia and Josh Crosby. Ollie Bardes was out of town. Our '21 group represented more than 25 percent of the total attendance of 48 people. Vic Phaneuf is now a life member of the American Society of Civil Engineers. He and I were graduated in Course II but he spent his engineering career in construction and taught it for the last decade. He moved to Largo shortly after his son moved his family there." Phil has become our star Florida reporter!

**Richard J. Spitz** writes that he lives at

100 Sands Point Rd., Sarasota, Fla. 33577 for seven months of the year to mid-May, when he and Dorothy make their trek to their summer address, Vineyard Haven, Mass. 02568. Dick says, in part: "I've wanted to write for a long time to find out how you are and to tell you what a fine job you are doing as secretary of '21. I retired in 1963 as vice president of the Newport Division of Tenneco after 38 years of a very enjoyable occupation. Have always enjoyed good health and continue to do so. We are blessed with children and grandchildren. Am enclosing a photo of my favorite occupation. We are looking forward to the 50th. Meanwhile, would certainly enjoy a visit from you if you are near either of our homes. My best to you and yours." Hearty thanks, Dick.

Heading the list of 50th reunion inquiries is a note from **Philip H. Hatch**, 70 Gibson St., North East, Pa. 16428, who is mindful of our oft-repeated request to those at a distance to make their travel plans now for June 1971. He adds: "Still think the '21 Class Notes in the *Review* are tops," which wins our sincere appreciation. . . . Kay and **Philip A. Nelles, Jr.**, 21 Sunset Rd., Stoneham, Mass. 02180, write: "We are looking forward to our annual reunion at Homecoming '70 and, to our 50th in 1971." Since these notes are being prepared in advance of Homecoming, the account of '21 activities on those two days last month will appear in a later issue.

**Robert E. Manley** wrote to Ted Steffian that he has retired to Hammock Gap Farm, R. F. D. 7, Box 37, Charlottesville, Va. 22901, after many years of service with the Texas Co., most recently as assistant supervisor of processing, New York. He has since served as a consultant on petroleum refining in the Canary Islands, Algiers, Bolivia, Canada, Italy and California. . . . Anne and **Wallace T. Adams**, 2606 Fleming Rd., Middletown, Ohio 45042, sent regards to all in attendance at Homecoming, explaining that their Alaskan trip in July had caused them to postpone a trip east until our 50th reunion next year. Wally notes that the granddaughter of Ruth and **Arthur R. Harvey** of Middletown is planning her wedding this summer. Wally has been named presi-



dent of the Butler County Planned Parenthood Association, which operates busy clinics in three major centers in the county.

Class Vice President **Irving D. Jackson**, Northfield Rd., Glen Cove, N.Y. 11542, wrote a lengthy description of his tour of Florida with Ruth early this year. In St. Petersburg, they visited Becky and Elmer Campbell at their home on a former grapefruit grove in the Seminole section. Gathering some of the fruit, all four visited Billie and Tom Bartram, who live on the edge of a golf course in nearby Largo. In Tampa, the Jakobsons had dinner with Graciela and Helier Rodríguez and remarked on the beautiful view from their high-rise apartment overlooking Tampa Bay. Then to the Port Royal area of Naples, where they lunched with Margaret and Dick Windisch in their home on one of the many lagoons. At Jupiter, they also had a luncheon date at the home of Helen and Miles Zoller, bordering a golf course in Tequesta where Miles plays every day.

Ruth and Jake's Long Island neighbors, Jane and Dayton Brown, were staying at the Boca Raton Club after a Caribbean cruise and the four got together for a short visit. Next they stayed several days in the "dream home" of Muriel and George Owens on the perimeter of a golf course in Vero Beach. Jake says they did find some time to see the Ringling Mansion, Edison's home, the Everglades and Cape Kennedy, adding: "Ruth and I have traveled through a fair number of places over the years, but never have we had such an enjoyable trip as this one, seeing old friends in their homes and enjoying their hospitality. It was wonderful to find them all in good health and enjoying their retirement activities."

Reunion Chairman **George A. Chutter**, Box 305, E. Dennis, Mass. 02641, writes that he and Vice Chairman **Paul H. Rutherford**, 7 Valley Rd., Nahant, Mass. 01908, are having luncheon meetings for program planning for our 50th. George saw **Ed Dubé** at the last Alumni Advisory Council meeting. He also reports that Helen and **Bob Miller** of Silver Spring, Md., are summering at their home on the Cape and that the

Millers and the Chutters attended an M.I.T. luncheon in Orleans at which **Donald B. McGuire**, P.O. Box 126, Freeman Lane, East Brewster, Mass. 02640, was present.

Mary Louise and **Richmond S. Clark**, P.O. Box 1400, LaPorte, Texas 77571, say they expect to attend our 50th next June. They live a half-mile from the Houston Yacht Club, Galveston Bay, where their 36-foot Pacemaker is berthed. Rich, who is writing a series of articles on boat registration and legal requirements, is the yacht club's liaison officer with the Coast Guard and its auxiliary. He lectures on boating safety in power squadron courses. . . . Charlot and **Robert W. Barker**, 713 Clarendon Rd., Narberth, Pa. 19022, observe their 45th anniversary this year.

Further to the honors recently recounted for **John W. Barriger, 3rd**, his constant companion on his long journeys away from home, his lovely wife, Elizabeth, told us that John was awarded an honorary degree by Rose Polytechnic Institute at last June's commencement. Class Agent Ed Dubé reports he was an invited guest at the Ritz in Boston for John's last breakfast meeting there.

#### New Jersey reunions

Assistant Secretary **Sumner Hayward** of Ridgewood, N.J., arranged another noon meeting for classmates living in New Jersey. A most enjoyable luncheon was held in the American Hotel, Freehold, attended by Sumner, William W. Brown of Short Hills; Munroe C. Hawes, Sea Girt; Helen and Albert E. Fowler, Jr., Somerville, and Maxine and Carole A. Clarke, Brielle. **Ralph M. Shaw, Jr.**, Beverly, phoned at the last minute that he had to attend an unscheduled business meeting. **Alfred H. Fletcher**, Jamesburg, reported he has undertaken consulting in his retirement, along the lines of environmental work he has been carrying out for many years. He is associated with Goodkind and O'Day, highway and bridge specialists. . . . **Joseph Wenick** and your Secretary got together at the 35th anniversary dinner of the M.I.T. Club of Northern New Jersey.

#### In Memoriam

It is with heavy heart that we record the

passing of members of our '21 families and extend to their dear ones the sincerest sympathy of the entire Class of '21.

Rebecca Berger Silverstein, wife of **Saul M. Silverstein**, 29 Stephen St., Manchester, Conn. 06040, and affectionately known as Rigi to many members of the Class, died in New York City on April 24, 1970. Together with Saul, she was active in attendance at Class meetings and in support of all '21 activities. . . . Eleanor Welch, wife of **George T. Welch**, 168A College Ave., Poughkeepsie, N.Y. 12603, died on June 7, 1969. Since his retirement as treasurer emeritus of Vassar College, they had traveled extensively in Europe. Also surviving is a daughter in California.

**Arthur Warren Norton** of 37 Ethelridge Rd., White Plains, N.Y. 10605, died on May 20, 1970. Warrie was born in Meriden, Conn., on December 4, 1896, and prepared for the Institute at Brown and Nichols Prep. At M.I.T., he was a member of Phi Beta Epsilon, Pi Delta Epsilon, a director of Corporation XV and on the Class of '21 executive committee. He was one of the founders of Woopgaroo and business manager and treasurer of its successor, VooDoo. He had been on the track and relay teams, in Tech Show and the Glee Club and was treasurer of the Technology Christian Association. He served on the Institute Committee, its finance committee and as chairman of the Report Committee. Other memberships included the Electrical Engineering, Mechanical Engineering and Aero Societies. During World War I, he was a cadet in the Naval Aviation Detachment at M.I.T. and in World War II, with the Board of War Communications. He later served on the Corporation of M.I.T. from 1945-51 and was President of the Alumni Association in 1945-46, having been Vice President from 1939-41; a member of the Amity Fund Board in 1940-41 and 1945-51 and its chairman in 1947-49.

He was graduated with us in Course XV, joining Continental Motors Corp.; then the business department of the *Brooklyn Daily Eagle* and, from 1923-29, a partner of O'Mara and Ormsbee, New York newspaper representatives. He became





While in Tokyo last March Oscar H. Horovitz, '22, and his wife (bottom photo) met Mr. and Mrs. Yoshinori Chatani, '22 (top photo), photographed at the newly built Imperial Hotel.

manager of the Christian Science Publishing Society, Boston, and a member of its editorial council. He was named chairman of the board of Press Wireless, Inc., and Press Wireless Manufacturing Corp., New York, before joining the *New York Times* as assistant to the publisher, the late Arthur Hays Sulzberger. Since then he had been a Christian Science practitioner in his home area. He was a trustee of the World-Wide Broadcasting Foundation, a member of the Boston Committee for Economic Development and the New England Council. He was a Mason and author of the book *Norton's Guide-forms for the First Reader*. Surviving are his wife, the former Helen Westfall of New York; two sons, Edward W. Norton and Warren S. Norton, and five grandchildren. The Class of '21 was represented at the services by **Sumner Hayward** and **Richard P. Windisch**. We are indebted to Sumner and to **Joseph C. Morrell** for information for these notes.

**Justin Richard Curry, Sr.**, of 96 Chestnut St., Andover, Mass. 01810, died on

April 5, 1970. Born on September 13, 1898, in Lynn, Mass., he came to M.I.T. from Lynn Classical High School. At the Institute, he was a member of Phi Kappa, the Varsity Boxing Team, the Mechanical Engineering and Aero Societies and the Catholic Club. In World War I he was a private in the S.A.T.C. at M.I.T. He was graduated with us in Course II. Justy spent almost all of his industrial career with J. H. Horne and Sons Co., Lawrence, Mass., manufacturers of mill machinery, retiring as general manager in 1967. He leaves his wife, Mrs. Alma A. Curry; three sons, Henry E. Curry, Fairville, N.Y., Justin R. Curry, Jr., Westfield, Mass., and James J. Curry, Pittsburgh, Pa.; a brother, Edward Curry, Swampscott, and four sisters, Mrs. Marcella Downing, Springfield, Mass., and Mrs. Catherine Rafferty, Miss Esther Curry, and Miss Marguerite V. J. Curry, all of Lynn, Mass. We wish to thank Harold Bugbee, Secretary of the Class of '20 for supplying information for these notes.

**Joseph McKay Spears** of 6825 Cloisters Drive, McLean, Va. 22101, died on December 28, 1967. He held the B.E. degree from North Carolina State College and was associated with us in Course II. During World War I, he was an ensign in the cruiser and transport service U.S.N.R.F. He had been superintendent of paving with the Highway Engineering and Construction Co., Selbyville, Del., and then lived in Washington for many years before moving to McLean.

#### Happy summer!

Please continue your subscription to the *Review* via the Amity Fund so you won't miss the unfolding news of our 50th Anniversary Reunion. Write to your secretaries now and please be sure to enclose that important data sheet from the Class Directory. Above all, plan now for you and your wife to "Join '21 in 'Seventy-one!"—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J. 08730; **Edwin T. Steffian**, Assistant Secretary, Steffian, Steffian and Bradley, Inc., 19 Temple Place, Boston, Mass. 02111; **Sumner Hayward**, Assistant Secretary, 224 Richards Road, Ridgewood, N.J. 07450

## 22

This is "hello" and "goodbye" for the summer with the next report to you due after the golfing, tennis and swimming season. To our regret we will probably not be on hand June 14 and 15 for the "Pops", lectures and Homecoming luncheon because of priority trips to Iowa and Colorado. Volunteers will be solicited for class notes concerning all of these events as well as the usual gossip of the family happenings which are of interest to us all. Please send in these items in sentences, paragraphs or three-page letter form.

A surprising postcard from Madeline and **Parke Appel** shows Kapaa, Kauai,

Hawaii during May. Parke writes that he met Jan and **Tommy Thomson** in Los Angeles and spent a couple days with them at Corona del Mar. The Appels then spent time at Hilo Bay, the Kona Inn, and on to Manuai Beach and Kauai Sands Hotel. They then returned to the Hawaiian Village at Waikiki for a final vacation week. They also talked to Hardy and **Jack Liecny** in Phoenix during their happy voyage.

**Abbott L. Johnson** and his bride Dorothy left for Europe in April to visit Finn Kuhnle '23 in Bergen, Norway and Harold Bjerke '23 in Oslo. They promised to return for our June meeting. . . . **Charles W. Maschal**, who retired from Connecticut to Laguna Hills., has crossed the country eight times by car but now he and Sally are content to rest in the West. They recently enjoyed a visit from **C. Lauren Maltby** of Sierra Madre for a few days. We are asked to tell **Chet Greening** of Westport that they deserted Connecticut because of the weather. It's surprisingly better in Southern California.

We have received a most friendly letter from Harriet (Mrs. **Henry S.**) **Dimmick** telling of Stu's death on November 20, 1969. Stu had been extremely happy fixing up the old family home which had been handed down to the next in line for twelve generations of Dimmicks. They have one son David Henry, who now lives in South Natick, Mass. He has three sons. Harriet plans on staying in the homestead at Cataumet, Mass., for a while and will welcome any of the Class of '22 who may be dropping by. Best regards and sympathy have been sent to the Dimmick family.

The sympathy of our Class is extended to the families of **John A. Chapman** of New Ipswich, N.H. and **William W. Bainbridge** of Pelham, N.Y. Bill Bainbridge is remembered as a great competitor during our sports outings at reunions. Our sympathy has also been extended to the family of **Henry T. Slamin** of Newton Center, a retired research chemist who was fatally injured in an automobile accident in May. He had attended the Drexel Institute in Philadelphia and the University of Chicago as well as M.I.T. He worked in the rubber industry in Ohio and in recent years was sales supervisor with the New England Gas and Coke Co. in Boston.

We note the following addresses: Dr. Geoffrey B. Gilvert, Victoria B. C. Canada; Charles C. Fulton, Venice, Fla.; John G. Campbell, Pocono Lake Preserve, Penn.

This completes the notes for Volume 72—1969-70 season; the feeling of your secretary is expressed as he completes his own private file with a quotation: "Genius begins great works, labor alone finishes them." Good health to you all. Write soon and often.—**Whitworth Ferguson**, Secretary, 333 Ellicott St., Buffalo, N.Y. 14203; **Oscar Horovitz**, Assistant Secretary, 45 Gerard St., Boston, Mass.

From **Lester B. Bridaham** we learn of the publication of his book *Gargoyles, Chimeres and the Grotesque in French Gothic Sculpture* by the Da Capo Press of New York City. Lester graduated with our Class, receiving degrees of S.B. and S.M. in chemical engineering practice and is now finishing a similar book *Gargoyles, Chimeres and the Grotesque in the Sculpture of the Middle Ages in England, Germany, Italy and Spain*. We are convinced that the book is the work of a master dedicated to the preservation in photographic form of the beautiful accomplishments of the stone cutters of the Middle Ages. Can we not hear more about the way you became interested in these fine endeavors, Lester?

We have just come across a letter written by **Theodore M. Edison** in 1964 to U.S. Congressman Hon. Walter S. Baring, Chairman of the Subcommittee on Public Lands of the House Committee on Interior and Insular Affairs in support of legislation to set aside more "Wilderness Land" in the public domain. His strongly worded arguments were most convincing in making the main point that such areas are critically needed regardless of the extent of usage by the public. We think from what we have read more recently that much has been accomplished in this direction, but not enough. Congratulations Ted for your fine work and effort toward saving our ecological balance!

From the "Institute Report" of May 21, 1970, Special Supplement, we learn that **David W. Skinner** has been appointed to the Board of Directors of the new "partially divested" Charles Stark Draper Laboratory. We are glad to see that you have accepted this assignment Dave. It is bound to be a tough job to settle the future of this fine organization that has so ably contributed not only to our defense posture but also to our space travel achievements. We deplore much of the mis-information generated concerning this operation by irresponsible campus radicals. . . . From **Reginald H. Peene** we learn that he retired from business 12 years ago and has traveled "extensively throughout the world since." His latest trip took him from Anchorage, Alaska down the East Coast of Asia as far as Singapore. Although the **Thomas E. Rounds's** did not start so far north we did much the same tour, taking in two weeks in Japan, along with Expo '70.

From **Robert S. Taylor** we hear briefly, "Am now 72 years of age. Am life member of the American Society of Heating, Refrigerating and Air Conditioning Engineers. Also a 50-year member, Emeritus Status of the American Chemical Society. . . . We continue to learn of the generosity of Mr. and Mrs. **Cecil H. Green** who recently gave \$600,000 to the Southern Methodist University Institute of Technology for an endowed chair. . . . **Roy B. Rinchliffe**, Fellow ASME has retired

from his chairmanship of the board and and chief executive officer of the Philadelphia Electric Co. Roy has been with this company since 1923 and will remain on the board of the company. The **John W. Berettas** recently travelled to Vienna where their daughter Jacqueline was presented to Viennese Society at the Ball of the Silver Rose held at the Palais Schwarzenberg on June 25th. That party and the ones that followed must have been grand occasions, both musically and socially, John. We will never forget our two visits to Vienna.

Now on the solemn side, we report the passing of seven of our classmates. **Paul B. Brown** passed away on April 20, 1970, in High Point, N.C. Born in Brockton, Mass., in 1898, Paul graduated with us in architectural engineering and was a member of Phi Sigma Kappa. His career spanned 40 years in the abrasives field, starting with the Norton Co., of Worcester, Mass., followed by a long association with both the Carborundum and Norton Companies in which he served various vice-presidential functions. Later associations were also in the abrasives field, retiring in 1967 as a vice president of ITT Abrasive Products Division.

We are also sorry to hear of the deaths of **Alfred A. Clough** of Contoocook, N.H., on November 24, 1969; of **W. Harold Donnelly** of Southern Pines, N.C., on August 26, 1969; of **John A. Dow** of Reading, Mass., on June 9, 1967; and of **Charles V. Reeves** of McLean, Va., on March 24, 1970, but unfortunately we have no further particulars.

**Henry B. du Pont** passed away on April 13, 1970 at his home in Greenville, Del. The many news clippings we have received along with personal notes attest to his long distinguished and useful public career as well as his success in the company founded by his great-great-grandfather Eleuthère Irenée du Pont. After graduating from Yale in 1920, Henry attended the Institute graduating in our Class with his S.B. degree. From 1924 to 1927 he was a research engineer with General Motors. Joining the du Pont Co. in 1928 as assistant treasurer, he transferred to engineering work the following year. Elected to the board of directors of du Pont in 1934, in turn he became assistant to the president, and in 1939 was named vice president and member of the executive committee. He contributed actively to numerous civic projects, including serving as president of a local school district for thirty years. He participated actively in the Greater Wilmington Development Council and his work on land use planning resulted in the formation of the Delaware State Planning Office. His other accomplishments are too numerous to mention, and as John Beretta says in a letter to us, "with the passing of Henry du Pont I have lost not only a classmate but also a fine personal friend. . . ."

We have more on the passing of **Joseph Nissen** on March 8 this year. From his widow Sophie (Smith) Nissen we learn that due to his outstanding scholarship

record at Rindge Technical High School in Cambridge, Mass. he attended the Institute on a four-year scholarship, graduating with an S.B. in chemical engineering and engineering administration. Later in 1937 he acquired an Ed. M. degree from the Harvard School of Education. Joe Nissen taught math, physics, chemistry and metallurgy at Rindge Tech for about 39 years and for many years he was associated with an industrial chemical firm. He was an accomplished sculptor and his creations in metal, wood and marble were widely exhibited. He was a member of many organizations including the Stein Club of M.I.T.

We are very sorry to report that **George Johnson** has had a long bout with illness and was in the hospital most of the winter. He is home now and coming along slowly. Our Vice President would be glad to hear from his classmates. Our very best wishes to both him and Mrs. Johnson.

This month's address changes include: Walter Dietz, RFD #1, Pennsburg, Pa. 18073; Water E. Ditmars, 390 Wetmore Rd., Columbus, Ohio 43214; Benjamin B. Drisko, Camden, Maine 04843; Salvatore A. Guerrieri, 503 Beverly Rd., Newark, Del. 19711; George H. Hurley, Rt.#2, Box 244, Burlington, Wisc. 53105; Hyman F. Marshall, 12 Highfield Rd., Quincy, Mass. 02169; Stuart P. MacDonald, Box 869, Dunedin, Fla. 33528; Michael F. Yarotsky, 4414 N. Harvey Pkwy., Oklahoma City, Okla. 73118.—**Thomas E. Rounds**, Secretary-Treasurer, 4 Deer Hill Dr., Danbury, Conn. 06810

It rather looks as though the Rev. **Denton Massey** has retired once again, this time from the ministry. At least when you see an address change from Ontario to Arizona that seems like a logical assumption. Of course it may be that Dent has been elevated to a more rarified ecclesiastical level—his new address is Paradise Valley.

**Pret Littlefield**, the Squire of Norwalk, Conn., has had experience in house-building, and he has a word of advice for **Bill Sturdy** and anyone else who is so engaged. "When it comes to building a house,/You're either a man or a mouse./ If you always say 'yes',/You're a regular guy,/But once you say 'no'/You're a louse." Pret also sends a somewhat cryptic message that seems to indicate a capitulation to the lure of the Sea. He says: "1. Bought fish rod. 2. Bought boat dock. 3. Bought boat. 4. Bought apartment to go with them." After all that it is certainly to be hoped that he catches a fish, at least a fluke. Pret shouldn't be the only one to get hooked.

For many years **Julius L. Piland** worked for the Veterans Administration. It is not known when he developed itchy feet, but for several years his address in our files has been a noncommittal "APO, NY."



Now comes a note that lifts a corner of the veil of secrecy. "I enjoyed the privilege of being a member of the M.I.T.-Harvard Society of Tehran-Iran for several years when on foreign duty there with U.S. AID during the years 1961-1968." The Alumni Association can now add another 1/2 club to its existing 92.

*The Nucleus* is the monthly journal of the Northeastern Section, American Chemical Society, and its longtime editor is **Avery A. Ashdown**. A recent issue stated: "As the *Nucleus* goes to press, the editor, Avery A. Ashdown, is back in the hospital. Latest word is that he is improving and the members wish him a very speedy recovery. To quote Avery, 'thumbs up.'" Unfortunately this is not a unique situation for Ave, but he has snapped back from so many previous hospital stays that he no doubt took this one also in stride. . . . A letter in late May from **Adolpho Santos, Jr.**, Engenheiro, of Sao Paulo, Brazil, informed us that he was about to take off for the Tenth Congress on Large Dams in Montreal, then go on a study tour to Toronto, and finally take off for Europe to visit his wife's family in Germany and Austria. Dolph said he would like to take time to come down "and have my wife meet you, Ed Moll, and whatever other classmates might be around Boston in mid-June. (However), I am saddened by much that is going on in the U.S. The only bright news coming out of the U.S. in many a moon was that about a demonstration by some hardhats in N.Y. So, here I am torn between conflicting emotions. Shall I visit my old friends for the sake of auld lang syne, or shall I give M.I.T. and the U.S. a clear berth?" Unfortunately your secretary was not available at the time, but Dolph and Ed Moll were pals in their student days. Ed was tracked down in his sylvan New Hampshire retreat, and as this is being written the wires are no doubt humming between Sunapee and Montreal.

You may remember that **Paul Schreiber** retired some years ago and immediately took up a promotional job with the Midland (Mich.) Area Chamber of Commerce. Let it never be said that the M.A.C. of C. is behind the times. In addition to the traditional interests of a C. of C., they have now gone in big for anti-pollution and conservation. The Schreibers have found a way to combat Midland's pollution—they've taken to the woods. "Now living on Wixom Lake, 20 miles northwest of Midland. The lake is still frozen over (April 1), but we look forward to sailing and fishing when and if the weather warms up." Let's hope by now that this uncertainty has been resolved.

Maybe our anti-pollution crusaders might learn something by going to Taiwan.

**Ray Lehrer** had this encouraging note to offer. "Back in Taipei I must comment on the fact that the city is kept spotlessly clean with no litter of any kind in sight. We were in a park where some small children were having a picnic, and it was interesting to see the little ones peeling their oranges over the litter baskets." Evidently it's possible. Did these children

learn by imitating their elders? Probably. So how do we teach our adults? Maybe we should send an investigating committee—as long as senators and representatives are excluded. The Lehrers visited Expo in Japan to wind up their trip, and the comment on one phase of the U.S. exhibit is both illuminating and disturbing. "The exhibit itself is well done and the big attraction is some of our space vehicles and a rock from the moon.

"There was one part though that was very distasteful to me, and that was the series of large photographs you passed on the way in. Someone commissioned ten of our leading photographers to make a series of pictures on life in the U.S., but judging from the subject matter they used, they did little to show our country as we know it, but seemed to delight in emphasizing some of our problems—such as a whole layout on a block in the New York Negro-Puerto Rican section plus many other scenes of squalor. One could only think that the photographers all belonged to the left group that seems bent on disrupting ordinary American life and sowing discord. Whether or not this is true, someone in our government should have put a stop to such propaganda and only put our best foot forward to show the world—which is what the Russians did."

On November 26 last year **Kenneth M. McDonald**, retired college professor in Birmingham, was rushed to the hospital with a heart block. Two days later Mrs. McDonald died. Dr. McDonald, recovering nicely, was released from the hospital on December 23.

We have word of the deaths of three classmates, one occurring more than a year ago. **Richard J. Chapin** died in Chicago on April 18, 1969. For many years Dick had been superintendent of construction and maintenance for Marshall Field and Company. At a time when big-city stores were reaching out into suburban areas, he found it an exciting and challenging job, and came to M.I.T. on several occasions to do a bit of recruiting.

Last January **Richard S. Bushnell** died in Brookline, Mass. Dick had been in poor health and unable to work for many years.

**Raymond Lambert** received his Ph.D. in chemistry with us, and spent his working life with Eastman Kodak. He died on March 11. To the families of all, our sincere condolences.

In the recent past several questions have been raised in these columns that are still unanswered. Here are a few: Did Bill Sturdy move into his new home in May? Did (or will) Ernie Kallander get his golf course done in 1970? Did Dolph Santos bypass the U.S. or not? How did Willard Woodin VanAllen survive the Maine winter? Maybe over summer some of the principals will clear up these and other mysteries. In the meantime, stay out of the hot sun. We want you all back

in the fall.—**Henry B. Kane**, Secretary, Box 177, Lincoln Center, Mass. 01773

## 25

The 45th reunion will be a matter of history by the time you read these notes. For those of you who could not join us for this event, pre-reunion gathering was held at Bald Peak Colony Club on May 28 with Ed Kussmaul, Jim Howard, "Chink" Drew, Sam Spiker and your secretary present. This being my first visit to Bald Peak, I can honestly say that it is a beautiful spot for a reunion, and all we need is favorable weather! A report on reunion activities will, of course, be delayed until the first issue of the *Review* next fall. Willard Gardiner has prepared some interesting statistical information from his survey, and this will be publicized in the class notes at a later date. Willard was hospitalized a few weeks ago but has been home now for several weeks and is doing very well.

**Jim Howard** reports that he has just returned from several weeks in Italy, having visited Sicily, Rome and Florence. Except for some problems resulting from the numerous strikes in Italy, he had a most enjoyable trip.

**Gilbert Tarleton** informed us somewhat belatedly that he retired from the General Electric Company at Pittsfield, Mass. on April 1, 1968 and has been doing a great deal of traveling since that date. . . . An item in the *Engineering News Record* dated April 9, 1970 notes that **Paul E. Hess** has retired as Vice Chairman of the Board of Directors of Blount Brothers, a Montgomery, Ala. contracting company.

Two deaths have been reported in the last month and Secretary Fred Lehmann has written to the widows expressing the sympathy of their fellow alumni. **Edmund O. Rublee** passed away on March 3, 1970 at Dublin, Ohio, and on April 24, 1970 **James G. Creveling** died at Delray Beach, Fla.—**F. L. Foster**, Secretary, Room 4-144, M.I.T. Cambridge, Mass. 02139

## 26

This last issue of the notes for the season brings some news about our 45th reunion. With a change of schedule at the Institute, reunions will come one week earlier. The Hotel Belmont cannot take us on the new date. Also due to his wife's illness, Don Cunningham felt that he had to resign as reunion chairman. (Since then Mrs. Cunningham has had a heart operation and is making fine progress.) With an exchange of several telephone calls between Class President Dave Shepard and your secretary and some arm-twisting by Dave we have a co-chairman set-up for our 45th—**Don Cunningham** and "Pink" Salmon have agreed to take on the job. Since they have each been chairmen of previous successful reunions and since they live within a few miles of one another, we are fortunate to have their acceptance.



I'm happy to report that on one of my phone calls to Dave's New York office I found he had "gone fishin" which is about the nicest thing that can happen to a New Yorker. Our new committee chairmen must first find us a new reunion location. By the time of our next issue of notes I'm sure we can tell you. The letters we receive from classmates indicate that many who have never before attended reunions will come to the 45th. Retirement gives many their first opportunity to schedule their time to attend. From now on this will be the first topic in the notes.

Clippings sent by Ed Huckman and by Richard Feingold '43, tell of the death of **Bob Chidsey**. "Robert S. Chidsey, first full-time engineer for the town of Simsbury, died on May 11 at New Milford Hospital. He was named Simsbury's engineer in 1957, after retiring from the State Highway Department. He also served as Torrington City engineer."

We also have word from the Alumni Association of the passing of another classmate who lived in Connecticut, **George Fogg**. George had been with the Defense Supply Agency at Bridgeport. For the Class we extend sincere sympathy to the widows and families of these two classmates.

A recent letter mailed from Boston written by **Malcolm Epstein** makes the second time he has done this. He never writes from his home in Jefferson City, Mo. Here are some excerpts from his letter. "Dear Smitty, Just so you have some news other than the present college situation, I have been in Boston on business since Monday. Last night I saw my wife off to England where she assumes her duty as a new grandmother (a son born to our daughter who lives in England).

"The bad world situation has not dampened my enthusiasm for our reunion next year nor my desire to attend. Sincerely, Mal Epstein. P.S. I have three rolls of movies taken at our 40th reunion. I'll bring them just in case we want to see our five-year aging process. I also still have your recipe for fish house punch."

While it is retirement for most classmates that makes news these days a couple of items came in recently that made it seem like old times to your secretary. **Earl McMahon** was recently promoted and we quote from the clipping. "Public Service Gas and Electric Company has announced the promotion of two of its Electric Generating Station superintendents. Earl C. McMahon of 40 Francesco Ave., West Caldwell, who has been superintendent at Sewaren Generating Station since 1956, has been transferred to Bergen Station in the same capacity." . . . And **Charlie Snow** indicates from the following clipping that he isn't fully prepared to retire. "Charles W. Snow, of 14 Walden Pl., Montclair, has established an investment counseling service at his home. Mr. Snow, a graduate of Phillips Exeter Academy and M.I.T.

has spent many years in the investment brokerage field."

There are still clippings and letters in the folder but it's such a nice morning here at Pigeon Cove that we must succumb to temptation and get out and enjoy it. For the past two weeks the lobster boats have been coming out of the harbor loaded to the gunwales with traps they are rushing to set for the lucrative summer market. Many of my sailboat competitors have their boats in and are sailing around happily although racing is a month away. And I have some brilliant new Zeiss binoculars so now I'm going out on the terrace to see what is going on. With that—Cheerio until October but start planning now to attend our 45th.

P.S. Just in! A note from Don Cunningham. Our 45th reunion has a home—Chatham Bars Inn, Chatham, Mass. More later.—**George Warren Smith**, Secretary, Pigeon Cove, Mass. 01966

## 27

"The Class of 1927 has lost another good man" were the words which Dike Arnold, our class president, used in sending word of the death of **Robert M. Bigelow** on May 21, 1970. Bob's home

was at 9 Standish Rd., Wellesley Hills; he died after a long illness. After graduation in Course XV, he was employed by Hobart Manufacturing Co. but joined United Shoe Machine Corporation in 1929 as an economic analyst, became director of research in 1955, and vice president and director four years later. At that time, he was also president of the K. J. Braun Engineering Company of South Norwalk, Conn., and director of the A. Kimball Company of New York and the National Tag Company of Dayton, Ohio. Bob was instrumental in guiding research efforts in the field of container systems, which led to USM's "Easy-Open" concept in packaging; he was also the official representative of United Shoe Machinery (now USM Corporation) to the Industrial Research Institute. After retiring in 1968, he continued to serve the corporation in a consulting capacity.

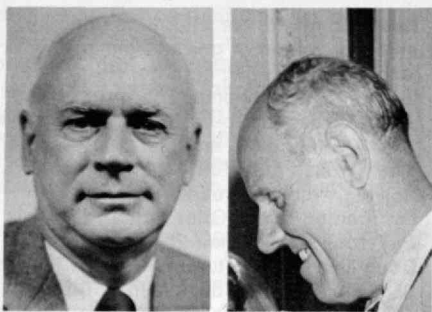
A native of Natick, Bob was graduated from Huntington Preparatory School, where he was president of his senior class. At Tech, his contributions were truly outstanding: manager of crew, wearer of the "T", vice president MITAA, freshman class secretary, senior class Institute Committee representative and treasurer, and member of the Walker, Beaver, Osiris, Calumet and Varsity clubs. His interest in M.I.T. continued throughout his life; he was a regular participant at Alumni Day. Bob is survived by his wife, Helen, two daughters and three grandchildren to whom we offer our sincere condolences.

We have the following interesting account from **Dike Arnold** of his winter vacation: "I spent the month of March in the south, most of the time at Boca Raton where I spent a pleasant evening with

**Rene Paine** and his wife. I also had an enjoyable game of golf at Palmyra C. C. with Mort Swift '26, his wife, Ruth, and the ladies club champ. The girls gave us a good lesson. I spent two very fine days with Al French '26 and Marge at Naples where I also saw **Tom Grier's** widow, Solveig, who had recently turned over the running of the Grier School for Girls in Tyrone, Pa. to their 26-year-old son, Douglas. Before returning home, I flew to St. Croix for three days with Tod DeFoe '25. He and his wife, Helen, have a beautiful home on the side of a mountain with a gorgeous view of Christiansted and the water on both sides of the island. I spent last weekend with Zella and **Ray Hibbert** in New Canaan and played in a member-guest golf tournament with Ray at his Woodway C. C. on Saturday. We had a game scheduled with **Bob Bonnar** on Sunday but it was washed out, so we drove up to Canaan for a most pleasant visit and lunch with Molly and **Jim Lyles**. The sun was shining brightly there when we arrived and we caught Jim mowing the lawn. He has rigged up a machine which he can sit on and operate with one hand and one foot. He does a great job with it and I'm happy to report Jim and Molly are in fine health. They are considering coming to Alumni Day and spending a couple of days at my house but this hasn't been firmed up yet."

Dike also sent along a letter written by **Pub Whittier** to Molly and Jim Lyles, which I'm going to assume Molly and Jim and Dike have cleared for publication. It starts out by telling of his finding a book in London which reminded him of Jim as the sort of guy who loved to quote folksy poetry at school. He sent it along with the practical suggestion that Jim wasn't necessarily struck with it but could use it as a bridge prize if he didn't like it. About himself, Pub writes in part: "I was put out to pasture on December 31, 1969 amid an embarrassment of compliments, kudos, gifts, and eatables galore. Within 10 days I was on a plane to Venezuela on a consulting job for Owens-Illinois International Division. I spent 10 days in Maracay and Valencia, making like an expert. An interesting country and containing some very friendly people. Late February, Ruth and I flew to Madrid where I began another consulting job for our Spanish subsidiary. We visited Seville, Cordoba, Murcia, Valencia and Barcelona. Instead of the usual March rain, we had constant sunshine except for 1½ days. After Spain, we spent four days in Mallorca, and then on to London, where we stayed with Ruth's sister. Rain-cold-wind describes the daily conditions. Sandwiched in was a 2½ day trip to Paris, which Ruth had never seen. Our sightseeing was accomplished by Thomas Cook buses because the weather was worse than in England! We couldn't get into any museums because the guards were on strike. So now we are back—and glad to stop living out of suitcases."

I am grateful to **Joe Melhado** for his excellent handling of the notes while I was away. I had the opportunity of dropping



R. Bigelow, '27

R. McCassey, '27

in at his home in Scarsdale, and seeing him and Marion, and talking over the inevitable complications which arose when he started writing the notes without the benefit of the basic files (which stayed here in Mystic). Based on his experience in business, Joe is practically a professional writer, and this was very apparent in the job he did.

**Sven A. Berg** passed away on May 4, 1970. Considerably older than the rest of us, Sven retired from Gilmanton Iron Works, N.H. in 1947. Although his own stay at M.I.T. was a brief one, both of his sons are M.I.T. graduates.

Word has only reached us now of the death of **Russell McCassey** in July 1969. His home was at 37 Montfern Ave., Brighton. Russ was one of those who laid the ground work for our 40th reunion and was always interested in the progress of the Institute. In his business career, he had been president of the Universal Paint and Chemical Co. and chairman of Russell E. McCassey Inc. He was born in Worcester and attended Erasmus Hall and Newton High School. At Tech, he was in Course I.

In a letter to Bob Bonnar, **Charles J. Davin's** wife has advised of his death in September of last year. He was at Tech four years, graduating in chemical engineering. In the early days, he worked for the Brooklyn Union Gas Co. His address was 17 Brownell St., Staten Island, N.Y.

Chick Kane, secretary of the class of 1924, has sent on a clipping from the *Exeter Bulletin* concerning the death of **Glenn Jackson**, who was graduated from Exeter in 1923. It is so well-expressed that it is repeated here: "To compile a complete list of the responsibilities Glenn Jackson assumed and the services he rendered to Exeter, M.I.T., his community, his profession, and his country would be impossible. He was a man in motion, whether serving as a reunion chairman or a consultant to a foreign power. In brief, he was a standard-bearer, an inspiring example of Exeter in action."

Kathleen M. Elton of Calgary, Alberta and **Herbert M. Houghton** were married

in Vancouver on March 24. We wish the couple much happiness. At the time of our 40th reunion, Bert had retired from the oil business and was selling mutual funds. His address is 1952 Vista Del Mar Drive, Ventura, Calif. . . .

**Ed Damon** continues to supply lots of ideas of where to go: "Super four-day train trip from Fremantle across Australia was fascinating. Three days in Sidney, then a bus tour of Canberra, Melbourne and Adelaide."

Les Woolfenden has left Westfield, N.J. and is back at the old stand at Pecan Dr., Paducah, Ky.; Francois P. Rousseau has a new address in Montreal—1321 Ovest, Sherbrooke; Edward O. F. Jones has moved from Northfield, Ill. to 10728 Saratoga Circle, Sun City, Ariz.; Dr. Royal Weller was in Italy but is back in Pittsford, N.Y. at 7 Brook Hollow; Charles S. Pope was in Arlington, Va., now at 11121 Powers Ave., Cockeysville, Md.; Emory F. Patterson, who was with Stram-Steel in Washington, Ill., is now at Weld Maine—up-country from Brunswick; Max L. Libman is at 1605 Greenbriar Ct., Reston, Va.; Henry W. Newell 347 Ravine St., Meadville, Pa.; Theodore E. Casselman, P.O. Box 758, Wolfboro, N.H.; Arthur H. Alden, Jr., Aucoot Rd., Mattapoisett, Ma.; Howard H. Burt, P.O. Box 2164, Chapel Hill, N.C.; Charles A. N. Armstrong, 7914 Himebaugh St., Omaha, Nebr.; Dr. E. H. Bramhall, 122 Hilton Lane, Pacifica, Calif.; Neil H. Cargile, 6016 Cargile Rd., Nashville, Tenn.; Howard A. Chinn, 757 NE Balaras Ct., Port Charlotte, Fla.; Prof. Robert R. Brown, c/o R. Roderick Brown, 79 Hemenway Rd., Framingham; John A. Adams, 7625 S.W. Copel Rd., Portland, Ore. (see mention of him, page 102, April *Technology Review*); Robert K. Doten, 8335 S.W. Garden Home Rd., Portland, Ore.; Rene E. Paine, Jr., 3050 N.E. 42nd St., Ft. Lauderdale, Fla.; lots of moving around and many apparent retirements.—**Joseph S. Harris**, Secretary, Box 654, Masons Island, Mystic, Conn. 06355

## 28

In June, 1969 **Bob Harris** retired from his position at the Institute as Professor of Nutritional Biochemistry and became

Professor Emeritus. This June he will be fully retired from M.I.T. Now we learn that Bob has had a very prestigious appointment. In September he will begin activity as the William S. Lasby Guest Professor of Health Sciences at the University of Minnesota in Minneapolis, Minn. During that academic year he will give two courses: one for seniors in the medical school and another for the seniors in the dental school. Preliminary to all this, Bob is going to Ireland in July to advise the Minister of Higher Education on the development of programs in nutrition and food sciences in the universities. The work is centered largely around The University Colleges, Cork. Also in July he will go to Switzerland to run a symposium. Papers of this symposium will be assembled in a book that Bob has been editing for 28 years, *Vitamins and Hormones*.

**Charlie Worthen** has thoughtfully sent in this excerpt from a letter he received from Commander **John G. Houpis**: "Life here in Greece is quite pleasant. The climate is ideal for an old retiree like me. I enjoy every minute of it. The average temperature is around 70°F and the lowest in winter is 40°F. Just now the countryside is covered with wildflowers. The air is free of pollution and the waters surrounding us are crystal clear. Bathing is already in season. Though the government is in the hands of the military, we enjoy every freedom offered by a democratic government except the right to criticize or vote (as yet). Greece is the safest and most quiet country to live in these days. One can walk the streets of Athens without fear of being molested, insulted or robbed. We have no strikes, demonstrations, violence, anarchists, hippies, student unrest, or destruction of universities! I wonder if a temporary military government like the one here in Greece would be helpful to democratic countries in turmoil (including the U.S.A.). Something is wrong somewhere—maybe Democracy needs an overhauling! Should any classmates be visiting in Greece, my phone is 987089. I will be very happy to meet them."

For his own part, Charlie agrees that Greece is a delightful country in April



and May. He and Velma visited the country in 1963 and hope to do so again. In his letter Charlie goes on to say "Life in Little Compton runs its more or less even tenor. Like all New England, it burgeons in the Spring. Summers are seasonally cool here by the ocean, and one doesn't have any need for air-conditioning. Autumn is another fine season and winter comes late owing to the lingering warm temperature of the sea water. I will admit (if pressed) that it is nice to get away for a few weeks in about February, just to get in the mood for Spring. Our two daughters live in California, so we took off in early January to drive out there. All in all it was a very enjoyable trip—easy driving and good weather once we got away from the east. We were in Atlanta on the 9th of January and the temperature was 6° above zero! The west coast was mild and comfortable as were the Grand Canyon, Death Valley, Tucson, Las Vegas, etc. While in California I looked up **Ray Wofford** at San Marcos. We had a very pleasant afternoon with Ray and Edith, who seem to have found just the place they wanted. Lake San Marcos is about 25 miles north of San Diego and only a few miles from the San Diego Freeway. It is a very nice self-contained community with golf, fishing, and other recreational facilities."

**Onnic Susmeyan** is soon to retire fully from his association with Raytheon Corporation after more than a quarter century of service. His various positions have carried both manufacturing and executive responsibilities. Recently, as Manager of the Division of Inter-divisional Business, he has had the interesting assignment of encouraging business between the various divisions of Raytheon. Although formally retired last July, Sus has been busy with the company since as a consultant. Now he is considering the possibility of doing some general consulting on his own. Sus is very much interested in photography—even to the extent of having his own photolab at home. He is a member of the Photographic Society of America and, through this organization, exhibits his work as an amateur in salons throughout the world. His specialty is character studies. One of his pieces took a prize recently at an international exhibit in

Hong Kong and was subsequently published in a Hong Kong photographic magazine. Another piece of his work took a prize at an earlier exhibit in France. Three years ago Sus took a trip to Europe and visited relatives in France.

**Jim Donovan** gets around much more than most of us and, we are happy to say, he faithfully reports on all of his contacts with classmates. A short while ago he talked with **John Hartz** at Good-year Tire and Rubber Co. Hopefully this comment will stimulate John to write us directly. Jim has heard that **Owen Rideout** is now retired from Hercules, Inc. where, as senior process engineer, he was held in very high regard. Indirectly, Jim learned that **Iris and Phil Taylor** have had a very nice trip to Europe. Phil is planning to retire soon. . . . For some obscure reason this next note was slow in getting to us: The September 1969 issue of *The Registration Bulletin* carries the statement that "**James A. McCarthy** was named Indiana Engineer of the Year by the Indiana Society of Professional Engineers at its state meeting in June, 1969."

We have two panel notes from the Alumni Fund office: **Slim Maeser** reports that he is now fully retired. He retired from United Shoe Machinery Corp. in September, 1964 then worked at A. C. Lawrence Leather Company as a consultant until January 1, 1970. . . . **Sam Weibel**, in his note, says "Lucille and I now enjoy a little summer place on N.H. Route 130, two miles west of Hollis. We are there intermittently during several summer and fall months. The latch string is out to any wandering twenty-eighters (or other worthy beavers) who may care to rest the weary foot or share a stein with us. Look for a '28 beaver."

**Bob Proctor** has had a lifetime of technical and administrative experience in practically all aspects of the paper business. This has included paper products, paper manufacture, paper manufacturing equipment, and product development. He is now with Weyerhaeuser Company in Fitchburg, Mass. but expects to be retired in about another year. He has long been active in TAPPI, the industry's principal professional society. Although he got off to

a late start as a family man, Bob has more than made up for any lost time. He and wife Peg have five fine children. Now they have two granddaughters, born the same day but a whole continent apart. One grandchild was born to their oldest, son Bob, in California and the other to their oldest daughter, Peg. Bob, Jr. is in the Air Force at McClellan Field, Sacramento, Calif. The second daughter, Nancy, studied at teachers college, married, and is now living in Kassel, Germany where her husband is stationed. Bob's second son, Tom, is finishing at Lowell Teachers College where he is a major in music. He plays French horn and trumpet, performs with several music groups, and teaches trumpet. The youngest, Bettyanne, is a junior in high school.

We deeply regret to report the death of three of our classmates. **Huyler B. Ellison** died February 23, 1970. Huy sent Florence Jope a note with his last Christmas card and mentioned that he had fallen and broken a rib. From the tone of his note we thought he sounded cheerful enough.

**Maxwell M. Kessler** died on April 28, 1970. He was director of metallurgy, Edgewater Steel Company in Pittsburgh. According to our most recent information he leaves, besides his wife Bess, two sons and two grandsons.

**John Y. Estabrook** died November 18, 1968 but the information has only now come to our attention. Earlier that year John had reported that he was retired and interested in music and yachting.—**Walter J. Smith**, Secretary, 209 Waverly Street, Arlington, Mass. 02174

## 29

I deeply regret to announce the sudden death of **Richard R. Wolfe**, of 320 Portwine Rd., Deerfield, Ill., on April 29, 1970. He was a senior partner of the law firm of Wolfe, Hubbard, Nait and Osann of Chicago and Rockford, specializing in patent law. He served as counsel for Harry Ferguson inventor, in a patent infringement suit against Ford Motor Co. in 1948 and received \$9,250,000 out-of-court settlement four years later, which



is a record. Richard received his law degree from George Washington University after having received his S.B. and S.M. from M.I.T. An Elder of the First Presbyterian Church of Deerfield, he was a member of its building committee and a member of the board of trustees of the Presbyterian home in Evanston. He is survived by his wife Elizabeth, a daughter, Mrs. Elizabeth Hubbell, and two grandsons.

In regards to our proposed informal 41st reunion at Bald Peak, I received a letter dated May 18, 1970 from **Frank Mead** who says in part: "We had written to all the members on the Reunion Committee and to Paul Keyser, our Alumni President-elect. We have heard from about everybody and in all cases, had an indication of interest and an indication of a desire to attend the proposed get-together. However, many of our committee members are out of the country, some unfortunately are ill, some have graduation commitments and, in two cases, there are wedding commitments. In conclusion it appears to have been a good try."

**Brig Allen**, first president of our Class and his wife Evelyn have moved to Florida and are temporarily living in an apartment until they decide what to do. Their address is 1613 West Oak Ridge Rd., Orlando, Fla., 32809, which is a few minutes ride from the "Sunshine Parkway" and Route 441. Brig says in his note that he is getting along fine down there as a "dam" Yankee, which term the natives define as a Northerner who moves to Florida and votes Republican. A Yankee is one who comes for a few weeks and spends \$1,000 and goes home. "I have had no recent contact with any of our classmates," he continues. "As usual, we have had a steady stream of company through February, March and into April, but most of the 'snow birds' have gone back home."

Professor **Nathan Rosen** was recently appointed Dean of the School of Technology at the University of the Negev.

**Maurice E. Barker**, Course X-A, writes that he retired in 1948 as Colonel M.S. Army and became professor and head (emeritus since 1961) of the Chemical Engineering Department, University of Arkansas. He has written many outdoor-type articles for *Outdoor Life*, *Field and Stream*, *Sports Afield* and *Scientific American* in the last ten years. He also has written a novel, *Changing Seasons*.

**Charles W. Sampson** informs us that he has retired as of May 30, 1969, is enjoying three grandchildren and is busy with gardening in summer and visiting friends. . . . **Warren A. Spofford** writes that he has been with the General Electric Company since graduation as project engineer, six years in Schenectady, N.Y., 21 years in Bloomfield, N.J. and 14 years in Tyler, Texas to date. He traveled through six European countries in 1961, toured the British Isles and honeymooned (his first wife is deceased) in the Caribbean in 1968.

**John G. Howell**, chief engineer for plant facilities—Owens-Illinois, Inc., in California writes in his biographical sketch: "Married: Very much to a wife named Katherine. Number of children: two daughters, both very beautiful (their father talking). Number of grandchildren: none—not even a son-in-law." He continues, "In 1929 I joined the Westinghouse student program specializing in marine sales which gave me an insight into almost everything that Westinghouse made, for a ship is like a city and contains replicas of all of man's developments. In 1931, while still with Westinghouse I enlisted in the Naval Reserve as a third class fireman. Two years later I became an ensign and in 1940 was called to active duty as an instructor in magnetic mine warfare. I finished my service in 1945 with the rank of Commander. In 1950 I received my fourth stripe and am now Captain, USNR, retired."

In 1934 John took a leave of absence from Westinghouse and went to the Pacific Coast where he first got a job with Standard Oil Co. of California and later made his connection with Owens-Illinois about which he writes, "After 32 years with Owens-Illinois, I have not regretted the change nor sought other connections. My responsibilities are broad, covering a wide range of engineering with ample opportunities for individual initiative and exploration. I have several patents to my credit and have the satisfaction of seeing many of these and other innovations working successfully to the benefit of the company and of our society in general." . . . Have a pleasant summer and please send me any news of your activities, as well as those of other Twenty-Niners that you may have.—**Karnig S. Dinjian**, Secretary, 32 Oldham Rd., Arlington, Mass.

## 30

This month's Notes might properly be characterized as the "lame duck" Notes. They are being written shortly before the 40th reunion at which a new slate of Class Officers will presumably be elected. I do not propose to do any campaigning so you may or may not be hearing from me next fall. . . . Reports of retiring classmates continue to come in. **Elizabeth Rossman Everett** has retired from teaching "modern" high school mathematics and says she now has time to enjoy life with her husband who is a lawyer in New York, and more time for country life and construction at their Falmouth house on the Cape. She does not say where she has been teaching, but my records indicate that as of 1962 it was Rye Country Day School.

**Donald McAndrew** has retired from Humble Oil but continues to engage in numerous civic activities including service as director of the Parish Council on Aging in Baton Rouge, La.

**Earl Ferguson** retired July 1, 1970 after 40 years with the New York Telephone Company. . . . **Bob Asbury** retired

from the R&D Department of Ethyl Corporation last September. . . . **Bob Whitten** has retired from du Pont, but doesn't give any details.

**Bert Whitten** retired from the Boston Gas Company in April 1966 and has since "been taking care of our property in Massachusetts and five houses in Searsport, Maine, three of which we rent." The Whittens have two children: Bertwell, who majored in ecology at Middlebury, received a Ph.D. in ecology from Purdue and is now working in the Army Laboratory at Natick, Mass.; and a daughter who received a master's degree in education from Columbia University and teaches remedial reading in Milford, Mass. In addition to his real estate activities, Bert works with the local YMCA and is an officer of a retired people's group in Roxbury.

**King Tow** returned to this country from Hong Kong in 1955 and is working for the Department of Public Works of El Dorado County in Placerville, Calif. The Tows have six children: Jimmy, who has a Ph.D. in electrical engineering and works for the Bell Telephone Labs in Holmdel, N.J.; Danny, who is a civil engineer with a master's degree and works for Gulf General Dynamics in San Diego; Don, who is a research assistant at the Lawrence Radiation Lab in Berkeley; daughter Billie, who is a registered nurse and mother of three children; and daughter Mei, who completes her work for a master's degree in social welfare at San Diego State College in June 1970.

**Joseph Kania** who, according to his letterhead, is associated with Pemberton Securities, Ltd., of Vancouver, reports that he recently returned from a South American tour of seven countries with the Vancouver Board of Trade Mission. In Caracas he had "a most fascinating and rewarding visit" with **Guillermo Zuloaga** and his wife. Dr. Zuloaga is a geologist and has played an important role in the development of the Venezuelan Geological Survey. (In the inconsequential fact department, Charlie Abbott and Dr. Zuloaga are the alpha and omega of our current class roll.)

**Stan Wells**, together with a number of other Eastman Kodak employees, recently received an award from NASA for contributions made to the Apollo projects. . . . **Ed Depoyan** is teaching at the Pinellas County Vocational Technical Institute in St. Petersburg, Fla. As previously reported in the Notes, he retired from Carborundum Company a number of years ago. Ed recently received a letter from **Denis Agar** who is a consulting engineer to the mining industry in the province of Quebec. . . . **Joe Harrington** was recently elected president of the Numerical Control Society after having served as administrative vice president last year.

We have at hand a clipping from the *Dallas Times Herald* concerning the death of another of our classmates,



G. S. Brown, '31

**Sam Zisman**, on March 25 this year. Sam was an internationally known land planner, a long-time advocate of open spaces and author of the statement that "the whole essence of planning is not where you build, but where you don't build." He had acted as a planning consultant for the Department of Defense, many large cities in both North and South America and several large foundations. Projects that he worked on included the Texas Instruments Central Expressway site and the University of Texas campus at Dallas, the Skidmore College campus in Saratoga, N.Y. and a study of open space planning for the Department of the Interior.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

## 31

Plans for our 40th reunion are well under way. On May 18, the first planning committee meeting was held at the Faculty Club attended by Larry Barnard, Fred Damiano, Ralph Davis, Ken Germeshausen, Ed Hubbard, Bill Jacobs, Claude Machen, Russ Pierce, Panos Spiliakos, '66 (Assistant Secretary Alumni Association) and yours truly. Larry Barnard was appointed chairman of the publicity subcommittee; Claude Machen, chairman of the program subcommittee; Fred Damiano, chairman of the regional subcommittee; John Olsen and Tom Fernside will be in charge of registration and club accommodations; and Bill Jacobs and John Swanton head up the reunion treasurer and class gift subcommittees. Russ Pierce, as usual offered to provide the supply of special brew for the traditional "shore" dinner and Ed Hubbard will back stop the general chairman, Ralph Davis, and assist whenever necessary to make this a highly successful reunion. The next meeting was held on Alumni Day, June 15, but unfortunately, yours truly couldn't make it. Howard Richardson, our prexy, couldn't attend the first meeting as he was traveling in the Orient.

Congrats to **Denis Morrell Robinson**, President of High Voltage Engineering Corp., upon his election to the National

Academy of Engineering . . . and also to **Earl Cullum** upon his election to the Academy. . . . A recent note from the Institute tells that Professor **Harold A. Freeman** will present short programs for professional people at the college this summer in "Statistical Methods in Modern Experimentation." . . . A note from **Don Holden** says that he retired from Newport News Shipbuilding and Dry Dock Co. on February 1, 1970. Have a happy retirement, Don.

Congratulations to **Gordon Brown** who received the Numerical Control Society's Jacquard Award for his pioneering work in developing the first practical NC system. . . . **W. Moore** has published a paper in the HEW Environmental Control Administration titled "Biological Aspects of Microwave Radiation: A Review of Hazards." . . . A clipping from the Worcester, Mass., *Telegram* tells of **Bob Wilson's** retirement last January from Sears, Roebuck and Co. He has been general manager in eastern Massachusetts since 1961. . . . Word from the Institute tells that **Ed Norris** represented the Institute at the inauguration of John Stephen Bailey as the fourth president of Nasson College on April 26, 1970.

Since your last class notes, word has been received that our following classmates have passed away: **Harold Alcaide**, **William A. Brown, Jr.** and **John B. Coyne**. Our deepest sympathy to their families.—**Edwin S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn. 06880

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**Arthur G. Russell**, of 134 Summer St., Bristol, Conn., died May 15, 1970 after suffering a heart attack. He was president and chairman of the board of the Arthur G. Russell Co. which he founded with associates who had worked with him during World War II and engineers from the Naval Research Laboratory. The firm designed and developed special purpose machines. Arthur was for many years district chairman of the Bristol Republican Town Committee and a former chairman of the city's Board of Finance. He was a Director of the Bristol Hospital and a member of the advisory board of the United Bank and Trust Co.

**Benjamin Wilber** has retired from the Ordinance Systems Dept., General Electric Co., Pittsfield, Mass., after 29 years with the company. Ben started with the company in 1940 as a designer in aeronautics and ordnance engineering at Schenectady. He worked successively on mounts for early radar sets, missile projects, Army ordnance, and mounts for the giant radar for the Atlas tracker program. He transferred to Pittsfield in 1958 and became senior mechanical engineer in 1962. Ben plans to be at home, 14 Baldwin Ave., Pittsfield, Mass. but is looking forward to a trailer trip around the U.S.

I have not heard directly from **Robert Butler** since his return from South America but an old friend, Paul M. Tyler, Class of 1912, reports he was fortunate in seeing him for the first time since 1942 at the Southwestern Florida Alumni Club Picnic in April. Paul seems to be the one who sent Bob to Brazil for two months—where he stayed for 22 years.

**Herman G. Protze** has formed a company named HGP—M and C at Newton Highlands, Mass. . . . **Jacob Millman**, Professor of Electrical Engineering at Columbia University, has been elected vice president of CompuScan, Inc., developers of advanced optical character recognition systems. He has been a member of the board of directors and a technical consultant. . . . By the time this column is published the happy band of classmates who could make it to Spain will have returned. Will give you some details of this interim-year reunion next fall.—**Elwood W. Schafer**, Secretary, Room 13-2145, M.I.T., Cambridge, Mass. 02139; **James Harper**, Assistant Secretary, 2700 South Grant St., Arlington, Va. 22202

## 33

Having done considerable visiting with M.I.T. groups in the east lately, it is only natural that we start with that story, as the material is of interest to all 1933 folks. We had a luncheon meeting of the New York M.I.T. Alumni Center on March 17, and 1933 was very much in evidence. In attendance were **Guido Garbarino**, **George Henning**, **Robert (Bob) Ripin**, yours truly, and last but not from least, **John Wiley**, New York Port Aviation Director, who acted as the genial M.C. and also gave a short talk, with slides, concerning the main subject, the Boeing 747. John gave us a picture of the way they solved the runway problem, which essentially consists of using the perimeter of the present Kennedy Airport. Apparently the reasons for this were many, but with an already overcrowded port the perimeter plan appeared to be the solution, at least for the time being. The main speaker was John Godfrey Borger, '34, whom the Alumni Register lists as Chief Engineer of Pan American World Airways. He also spoke on the 747.

On March 25, a group of around 40 alumni directly interested in the Alumni Fund met for dinner at the New York Yacht Club, West 44th Street. Dr. Howard Johnson, President of M.I.T. spoke to us. Classmates at this Alumni Fund meeting were **Ellis Littmann**, **George Henning**, **Malcom Fleming**, **William (Bill) Klee**, **John Wiley**, and myself. Three of these are way-out-of-towners, and I figure that we travelled, total, about 6,000 miles. It must take George Henning a couple of hours to drive in from mid Long Island.

The last of the alumni events was the Alumni Council, which met March 30 at



the Faculty Club. I saw many, many old friends from other classes, but only **William (Bill) Barbour**, and Professor **Richard (Dick) Morse**, from 1933. I had a nice visit and a drink with Brenda Kelley, our lovely Alumni News Editor; a visit which is always inspiring. Brenda has the rare combination of attractiveness, and, is also very, very, capable. She grows on ya! I shall not make any attempt to tell the story of the meeting as it will appear much sooner than this in the *Review*. The toastmaster did introduce two candidates who were allegedly electioneering for the job of next year's Vice Presidents of the Alumni Association. One of them was Rufus Applegarth, Jr., '35, who got in a great plug for himself by showing motion pictures of Acapulco and the Mexico City M.I.T. Club Fiesta. Rufe did a great job, and I enjoyed him no end in Mexico City also. Hence I know that he will get at least one vote.

Now for the 1933 class story; and it is fitting that I start off with one of my very own, **Robert W. Timbie** of Pensacola, Fla. Bob is the son of the late William Timbie, Professor and Emeritus Professor of Electrical Engineering until his passing in 1959. Bob and Ruth showed up in honored glory at the 1970 Mexico City Club Fiesta; the first of our Class who responded to my laudatory accounts of the event. Fellows and Gals, Bob and Ruthie had a picnic. They loved every minute of it all, and this year's Fiesta was above average. After 37 years we get an up-to-date story of the Timbie family. The Timbies have three children: a daughter, a graduate of Pensacola Junior College, married, with four children; a son, a graduate of Alabama, married, with one child; another son, a graduate of the University of Tennessee, and a lieutenant in the army. Ruthie herself, is also a degree holder from East Tennessee College. Bob previously held the position of designer of textile machinery for Monsanto, and is now busily engaged in R&D for the same firm. As for Bob's hobbies, he is the family and neighborhood Mr. Fixit, so we presume that he has a lot of mechanical ability. Further, Bob is a pleasure boat designer and builder, but only for himself and family. Until he gets ready to build another, he sails the current model, and does a little fishing. Ruthie is also a busy gal at needle work and ceramics, and just to be sure to keep busy she does volunteer work at the hospital, the Easter Seal Society, and the Y.W.C.A. Ruth and Bob both have fond memories of the 25th, when they met and visited at length with Leona. Bob and Ruth, it was great! Please come again, even if I don't make it. I, as you know, am an Eager Beaver (see award over my dresser), so I don't have to go every year. Thanks for all the info, folks. I love y'all.

From the long ago, we recall the next contributor, **William W. (Chick) Laird** of Wilmington, Del. Chick writes in response to a card of mine and puts the story into a very nice letter. Thanks a whole

million, Chick. Says he, "At 60, am trying to sneak into an early retirement, one which will be from regular business, into a more flexible set of activities better suited to the geriatric pace," which he says will suit him, but probably not his wife who is more used to a regular daily schedule. Gee, I must quote this next as I can't do justice to it. "I am expecting to get into a land development scheme in West Chester, Pa., 20 miles north. The emphasis will be on homes and casual surroundings for families with kids: a mud room in every house, a water cooler outside every kitchen door for miniature ballplayers, subdivision restrictions which will encourage pets. There will be 100 acres of trashy woods, with a stream now, and a real chance to make a water hole for the above kids." A ball field, presently a flood plain, is also planned and there will be no prohibition on cutting firewood, with its use under supervision. The Laird children are all grown, and properly educated, though no details are available. The eldest is a daughter 32 years of age, and two sons 28 and 24. Chick goes on to thank me for the "thankless job of writing class notes." Chick, it is definitely not thankless, as you might be surprised at the extent of such expression I get from all over. And again I say, I hope you all like the stuff; to me the job is something that I can do, I hope well, for my Class and the Institute. It is far from thankless.

From the Mitre Corporation comes a first-time story about **Clare Farr**, of Reed's Ferry, N.H. Clarence has been named to head Mitre's newly-formed liaison office, his role being that of assistant to the administrative vice president. The new role appears to be of a problem-solving nature throughout the corporation. His responsibilities cover the design, implementation, and interpretation of the corporation's technical document publication and patent procedures, including the numerous areas where the U.S. Government is involved. Clare's biography to date: a short time with E. G. Budd Mfg. Company in stress analysis, ten years with duPont in their engineering department and with the Manhattan Project, a brief period spent with Dewey and Almy Chemical Corp., the period from 1955 to 1959 spent as assistant to the head of the computer division of Lincoln Laboratories, joining Mitre in 1959. He is a member of the Institutes of Chemical Engineers, and of Electrical and Electronic Engineers. He is also listed in *Who's Who in Engineering*. Clare and his lovely Aline have two boys who must now be between 25 and 30. Gee, as long as I have known this fella, I have to get a news release to find out that he actually works for a living. Allow me to extend to you, Clare, the congratulations of your Class. We are proud of such classmates. Further, a word from Aline would help keep me good natured, especially if she sends in the story of the two boys.

From Carole A. Clarke, Secretary of the Class of 1921, comes a press clip con-

cerning Mobil and its senior vice president, **Dayton Clewell**. As head of all research, Dayt announces the development by Mobil of a device which eliminates virtually all pollutants from automobile exhausts. They have adapted this device to a car, having unveiled the experimental assembly at a press conference, presumably in Philadelphia. Essentially a catalytic converter hooked up with other control devices, the device as yet unnamed is in actual running condition in the car and will meet all standards of control of auto emissions, and the proposed standards of the 1975 federal government. In spite of recent announcements by major oil companies concerning leaded gasolines, Dayt says that the new Mobil device will handle either leaded or non leaded gasolines equally well. Dayt, we are always glad to hear how well you are doing, and regret only your inability to write.

Again we hear, indirectly, from one of our more notable irrepressibles, **Donald Fink**, General Manager of IEEE. The news comes to us in an article titled "Market Trends in the Electronics Industry." It appears that although the economic pace of the U.S. electronics industries has slackened in recent years, the sale of these products to industry is on the rise. In the article Don uses four large printed pages in support of this statement. Briefly, Don took his S.B. when we did, but has received a master's from Columbia since then. He taught briefly at M.I.T., then worked with the radiation lab there. During most of the war years Don devoted his time to Loran work, laying out sites throughout the world and attending the atom bomb tests at Bikini, as civilian aide to Admiral Blandy. Aside from private employment with Philco and others, Don served his country in congressional committee work and as a consultant. He is the author of many books which have become standard reference and text books, and has been general manager of I.E.E.E. since its inception. He also charged me \$8.00 to visit two floors of the recent (March) electronics exposition at the New York Coliseum, which was incidentally a great show which other engineers might look forward to in the future.

From the *Saturday Review* comes a six-page story called the "Green Light for the Smogless Car," and with it a mention of our classmate, **William M. Brobeck**, and his associates in Berkeley, Calif. The article begins with a discussion of the internal and the external combustion engines, very obviously favoring the external. All the action seems to be in California, so when they were seeking someone who could design or build a steam car, limousine or bus, they had only to turn to Bill Brobeck who has been engaged in some form or another of steam transportation ever since he took his S.M. with us. Golly, what a story that fella could tell us! Further, in the course of the steam discussion, it is only natural that our own **Richard (Dick) Morse** should make an appear-



ance. Dick's contribution to the topic was a suggestion that the costs for research, design and building of the steam vehicle might well run 20 or more times the estimates of the experts out west. Anyone who wishes Bill Brobeck's address for further information, has only to drop me a line, complete with autobiography.

Fay, Spofford & Thorndike, Inc., have only recently announced the election of a new president, our own **Fozi M. Cahaly**, via the press. Fozi is a graduate of our oldest course, civil engineering (I). If memory serves correctly, one of the founders of this fine firm was Professor Spofford, and we have his son Norman Spofford as one of our classmates. If this is inaccurate, will not someone please correct me?

From the American Society of Engineering Educators (A.S.E.E.) comes word that Professor **William M. Murray**, S.M., Mechanical Engineering, has been appointed the New England Regional Coordinator of the Society, and is designated as local action contact between the region and the national office. . . . Through a newspaper, news comes that **Lynn A. Williams**, of Chicago, has recently sold his company, Anocut Engineering Co. to Brown and Sharp Mfg. Co. Lynn first introduced the electro-chemical machine process, through his company, a process which they describe as the "cutting and shaping of metal components by accelerating electroplating in reverse." The ECM seems to enjoy a virtual monopoly of the process as a whole, doing half the available business in the U.S. and  $\frac{3}{4}$  of the foreign. Lynn took a master's with us, after previously taking degrees from Yale and the Harvard Law School. He began his career as an attorney for the Stewart-Warner Corp; later he moved to the Great Books Foundation, and then to the vice presidency of the University of Chicago. In 1951, he decided to enter private practice of law, where he first encountered the development of the ECM process.

**Cal Mohr** again comes through again, this time with a fine note from Illinois. With little in common as students, Cal and I were, and still are, great friends, so that a lot of the text of his letters is fine, but not of too much use to the column. But he does help me to remember, no matter what. For instance, who but Cal would or could, remember Gene Cary clearly; he recalls Gene working in Walker, and also the Cary marriage, same place. They met once since 1933, in Chicago, where it appears Gene was working in a loan division of some insurance company before he went to war. Cal also remembers **Fred Walker**, probably from living in the dorms. Cal's question: isn't he the big guy with the sandy hair that lived in the dorms? Yes friend, he has to be as he is the only Fred Walker in the Alumni Register, and forsooth, tempus sure as all heck fugits, Fred no longer has sandy hair, if his photo in *Goodridge 25* can be depended

upon. In that photo, he has practically no hair, and I do hope that Fred is not of the sensitive set, though few engineers are.

Just to remind y'all about my annual visit to Mexico City, please allow me to carry on just a little about the great Fiesta put on each year by the Mexico City M.I.T. Club. This is the three-day event where they are forced to limit the number of visitors to about 100, many of whom are from the Class of 1921. I wouldn't miss it for all the tea in China (quote). So, March 11, we took off via Aeronaves, for three or four days. The parts that I enjoyed the most are the get-together, welcome luncheon, where Nish (Clarence) Cornish, '24, handles the introductions; every alumnus must introduce and identify himself, his class, and any other salient point or points. This includes the Club members, of course. Practically every man present is accompanied by his wife, which makes me unique, as Leona just will not fly across the Gulf of Mexico. The other and just as enjoyable event is the Noche Mexicana, this year at the Cornish Castle. The Noche features Mexican (and other) drinks of inspiration, and Mexican dances by alumni and wives from the Mexico City Club, all in local costume. On two sides of the high garden wall, local girls prepare the fine Mexican delicacies, such as tortillas, enchiladas, tamales, and many more, none as highly spiced as they would be in San Antonio. When this is being read, I, your secretary will probably have been presented with the "Eager Beaver" Award for having attended four Fiestas. In 20 years, three Presidents of M.I.T. have attended this great event, and this year Jim Killian will again be present as the honored guest. So far I have seen just one classmate in my four visits, though **Courtenay Marshall** was in town last year, but had to leave because his good wife became ill.

Fellas, why not mark the calendar for next year, and take my place for once? You are old enough, and mostly successful enough to make this trip a part of a great vacation for you and your wives in Mexico. I will not allow you to forget it. If it is worth the time and effort of such men as Doctors Killian, Stratton, and Johnson, it sure ought to be for any and all of you.

We have a few of our fine Alumni Fund capsules, loaded with concise information. **Walt Swanton** says that one of his co-authored papers was translated into Swedish, and published in their journal *Koy*. That's all. Maybe some of you chemical engineers, or Swedes, can make use of it. . . . Says **David B. (Dave) Smith**, "I have resigned as President of HRB Singer, and am now Chairman of the Board of Planning Dynamics, Inc., of Pittsburgh, a consulting firm in management." I must give up right here, as Dave is also giving a course at—School, of the University of Pennsylvania. I just could not make out the name. Thanks, Dave, and I will ask you what

you said when I see you at Alumni Day in June. . . . Another of our capsules is from **William V. Reed**, AR, Puerto Rico. I well recall visiting with Bill and his lovely Italian girl, Juliana, and with Bill Pleasants, on a stopover in San Juan. Bill still does a bit of bragging about our M.I.T. man, Governor of Puerto Rico, which is natural. Son Christopher, is applying for a graduate fellowship at M.I.T. for next year, as he will graduate from California Institute of Technology next June. That's great Bill. Thanks a lot and best to the girls.

We had two classmate visits this winter; **Clare** and **Bill Baur**, and **Ros** and **Ellis Littmann**. The Bauers were on the Florida round-the-world trip: St. Pete, Fort Myers, Naples, Miami, Fort Lauderdale, Palm Beach, thence north. I suspect that they were on the look-out for a permanent home, and appeared to be just a little discouraged, mostly with the apparent abnormal traffic situation. As Bill is fully retired (he is not even doing any consulting), he had plenty of time for extensive travelling, which they both like very much. Clare has gotten over her bone break of a year ago and is as good as new. We enjoyed them so much, especially as we get so few Course II mechanical engineers. Thanks for stopping, Bill and Clare. Ellis Littmann phoned me one day and said that he and Ros would be in South Florida two days later, where Ellis was to attend a three-day meeting at the Boca Raton Hotel and Club and asked if we would be at home for a visit. The Littmanns were more than dutiful in raving about our beautiful Florida home, though no mention was made of the beautiful home in which they themselves live in Saint Louis; one of the most beautiful that I have ever seen. We took them on the full dollar tour, which includes the beach and the grounds, after which Ellis had to take off for the meeting of some chain gang or other. (Ellis, among many things, makes chains in St. Louis.) Ellis and Ros, we enjoyed your visit more than immensely. Please come back, and all classmates are also invited, next year of course.

Although we feel guilty that we are so late in reporting it, we are saddened, as you will be, to hear of the very sudden passing of Mildred (Skip) Hapgood, on February 11, 1970. Skip was the good wife of **Cyrus (Cy) Hapgood**, patent attorney in New York City. Besides Cy, Skip is survived by two daughters, now 19 and 17. For the entire Class, I offer Cy our most sincere sympathy in his great loss. For me, I lose a little more; Skip was a charter member of the wives' club, those who wrote directly to the secretary for husbands with little time for such mundane work.

We have a few changes of address, and as usual these and all addresses may be obtained by writing the secretary, IF the request is accompanied by a short family biography. The changes: Louis Alpert, Course III, ML; Donald S. Britton, VI, EE; Dr. Newton W. Buerger, II, ME; J. Mason Culverwell, III, ML; Melville

Ehrlich, V, CM; Samuel W. Grossman, X, CH; Edward P. Oxnard, V, C; Robert W. Ripin, IXB, GE. . . . That's it for this academic year. Please wait patiently for the interim letter, or letters, due out before September 15. Yours faithfully—**Warren J. Henderson**, Secretary, Fort Rock Farm, Exeter, N.H. 03833

## 34

As another year of *Review* notes comes to an end it seems appropriate to welcome two more class members to the ranks of those of us who have bid at least a partial farewell to the rat race. We have news of three retirements but as you will see, at least two do not expect time to hang heavily on their hands.

From **Bill Ball, Jr.**, comes the following note: "After 32 years with Ethyl Corporation, I have retired as of April first. The National Association of Manufacturers has asked me to be manager of member relations for its Eastern Division so will remain in the New York City area. Son, Dick, is at the Wharton Graduate School in Philadelphia while daughter, Nancy, is a White House correspondent for *Newsweek* magazine out of its Washington, D.C. office. My erstwhile thesis partner, **Ed Asch** and very charming wife, Irene, have retired to Houston, Texas. With all the legislative and public relations attacks on industry as a whole, I was particularly willing to join N.A.M. because of the good job it has been doing in Washington and elsewhere to protect all industry, large and small, from needless or ill-conceived legislation and to help defend against unwarranted attacks by those who would remake the environment overnight without regard to the cost burden which the public must ultimately absorb. (P.S.—the "Jr." denotes that Bill Ball, Sr. is well and happy as a member of M.I.T. '05 in Bradenton, Fla.)"

**Peter Kalustian**, who received his S.M. in Course II with us, also retired in April. He has been with Drew Chemical Corp., Boonton, N.J., since graduation and at retirement was general manager and group vice president of the Food Products Division. Over the years he had wide experience and responsibilities in food fat and edible oil product operations. Peter is a registered professional engineer and has been active in technical societies related to his field of work. He, too, will fight off any tendencies to boredom by carrying on a limited consultation practice.

I'm sure we all wish these three classmates the best in this new phase of their lives. Personally, I applaud their good judgement. I've been at it for two years now and have never regretted my decision for a minute.

This month there are all sorts of items from and about **Phil Kron**, our Class Agent and official reunion moviemaker. (After all, he's close to the source of the film.) Firstly, from one of his solicitation

letters we find that contributions are holding up very well and that we are getting off to a good start for our 40th Reunion Gift Fund. This same letter had a note added by **John W. King**, to wit: "I agree wholeheartedly with you that environmental pollution is the fundamental cause of student unrest at M.I.T. I have written a new book, *Save Money and Grow Rich* (published by Lyle Stuart, New York) which is actually a handbook for those of us who do not want to join in the squandering of our natural resources. It gives vital facts which can add richness to our daily living and zestful years to our richer years without destroying these resources. Your comments on 34-inch waistlines interest me. Mine is still 32, as it was at M.I.T. The topic, Reducing, in my book indicates how I have been able to maintain my 32-inch waistline effortlessly."

Back to Phil, himself. From several sources came the news that he had been elected president of the National Association of Purchasing Management. This fine honor comes as a recognition of the many years he has devoted to the Association's activities, his national speaking and writing in the purchasing work, and his years as assistant director of purchasing for the Kodak Park Division of Eastman Kodak. Phil joined Kodak after graduation and except for wartime service with the Air Force and a three-year period as a manufacturer's representative, he has been with them ever since. He has held his present position since 1955. (A vagrant thought: EK is one of the world's largest users of silver and Phil is responsible for their purchases. If we start saving our silver quarters, maybe some day we can get a good price for them from him.)

We have a scattering of brief notes on the activities of some of our classmates. **Egor P. Popov**, Professor of Civil Engineering, University of California, Berkeley, received the M. Hetenyi Award from the Society for Experimental Stress Analysis for the best paper of 1969. . . . **Andrew T. Dempster** participated in an April seminar on "Control of Industrial Waste" in the Chicago area. From the program notes we find that he was associated with the Bureau of Sanitary Engineering, Detroit Department of Health for 31 years, 17 of them as director of the bureau. He is now project director, Wastewater Technology, National Sanitation Foundation. . . . **Robert N. Eck**, manager of product safety and industrial standards for Cutler-Hammer contributed to the revised fourth edition of Harwood's *Control of Electric Motors*, a major reference text in the field.

**Robert C. Gunness**, President of Standard Oil Co. of Indiana testified before the Senate subcommittee on air and water pollution. He spoke on the extra cost aspects of lead-free gasoline and the problem of persuading motorists to use such a higher cost fuel during the period that leaded fuels would have to remain on the market. One means he suggested was a differential fuel tax to make the

lead-free gas economically attractive. It is interesting to note that this suggestion was made to the Senate committee two months before President Nixon proposed it as an "antipollution" tax.

**Eugene Magenau** was good enough to return one of my change-of-address post cards. He tells us that he and his wife Sara have two children, Roger, 33, and Genie, 26. He is now living at 95 Halsey St., Providence, R.I., where he is the field architect for the new ambulatory patient center of the Rhode Island Hospital.

We are sorry to report the death of another member of the Class, **Frederick D. Drew**, in Washington, D.C. on July 12, 1969. Can George Bull or any other of the class faithfuls in the Washington area give us any information about him?

From the Alumni Association we have notices that two active members of the Class have recently moved. Jim Eder is now in Hialeah, Fla., and Johnny Hrones is back in Somerville, Mass. We'll try to have some more about these changes in the fall. . . . We hope you all have a good summer and send us fabulous lies about your adventures. Right now, we're off to pull lobster pots, one of the Cape Cod fringe benefits.—**R. M. Franklin**, Secretary, Satucket Rd., Brewster, Mass.

## 35

Attending the recent Mexico City M.I.T. Club Fiesta from the Class of '35 were **Rufus Applegarth**, candidate for vice president of the Alumni Association, and **Peter Grant**, with his wife Jane. . . . At the Institute, **Carl Floe**, former vice president for research administration, returned to teaching and research in 1969.

**John C. Alden** has written that he still has time for hobbies like mountain climbing, skiing, canoeing, square dancing, steam engines and an HO gauge model railroad.

In April, **William Wesley Peter**, Vice President of the Frank Lloyd Wright Foundation, was married to Svetlana Alliluyeva, daughter of the late Joseph Stalin.—Co-Secretaries: **Phoenix N. Dangel**, 329 Park St., West Roxbury, Mass. 01232; **Irving S. Banquer**, 20 Gordon Rd., Waban, Mass. 02168

## 36

The *Newton Graphic* carried an obituary for **Harry Pekin** who died May 3 following a brief illness. He was a widower and had been associated with Raytheon in Waltham for 30 years. At the time of his death he was program administrator. He is survived by a daughter, Susan Kaplan, two grandchildren, a brother and two sisters. To his family the Class extends its sincere sympathy.

With his contribution to the Alumni Fund **Frank Berman** has reported that he is a



Senior Consultant with Hazeltine Data Systems Services in Little Neck, N.Y. . . . The *Wall Street Journal* carried a news item with the heading "Peking's First Satellite was believed planned by a U.S.-trained scientist." The man referred to was **Tsien Hsue Shen** who is listed as a graduate member of '36.

The John Jeppson Award and Medal, given annually by the American Ceramic Society for outstanding achievements and contributions to ceramic technology, was this year awarded to **George J. Bair**, director of technical staff services at Corning Glass Works. The medalist received his doctor's degree with our Class.

Another medal, the Edwards Medal of the ASQC, has been awarded to an undergraduate member of the Class, **Dorian Shainin**. The citation which accompanied the medal reads "in recognition of his imaginative and effective use of applied quality assurance and control techniques in industry, and a dedicated commitment to the educational needs of practitioners at all levels." Dorian is a vice president of Rath and Strong, Inc., Boston Management Consultants. Our congratulations to both these medalists.

Appearing in print is **Henry Lippitt** with an article in *Public Utilities Fortnightly* titled "State and Federal Regulatory Agencies—Conflict or Co-operation?" . . . The Alumni Office notes that **Bill Royce** is president of the M.I.T. Club of Hawaii. His address is Bishop Trust Company, Ltd., 141 South King Street, Honolulu (zip 96817). . . . The office also officially informed me that your secretary is chairman of the Committee for Ladies' Hospitality for the meeting of the International Union of Pure and Applied Chemistry being held in Boston in July, 1971. This summer of 1970 finds me writing these notes at my daughter's home in Indiana and by the time you read them I shall be somewhere in the vicinity of Crater Lake. When I return to New England in early October I will be dividing my time between my home in West Hartland and a new apartment in Cambridge at 100 Memorial Drive.—**Alice H. Kimball**, Secretary, P.O. Box 31, West Hartland, Conn. 06091

## 38

These notes are being written on the first clear, sunny day that we have had in a long time. It is the end of May and you will be reading these paragraphs in the summer time.

**Peer Cody** wrote me a protest letter pointing out that his company is the Velsicol Chemical Corporation, a subsidiary of Northwest Industries where he is the manager of process engineering. Peer lives in Barrington which is northwest of Chicago. His oldest son, Alan, graduated from Cornell last year and is now in the course of a four-year stint in the Air Force after which he plans to take advantage of his acceptance at the

Sloan School at M.I.T. Peer also has a son, Eric, who is a sophomore at Amherst and a daughter, Allison, in high school.

A number of Eastman Kodak employees were honored by the National Aeronautics and Space Administration with an Apollo Achievement Award. Included in the citations was **R. G. Bowie** of the Class of 1938.

**Dave Carsen**, who is a vice president of Omnidata Services, Inc., in New York, wrote a provocative series of articles for Civil Engineering: "Civil Engineering today: A profession in crisis." He pointed out the problems and inequities in the civil engineering profession that have caused a decline in the number of civil engineers at a time when there is a great need for their skills and talents; and, what's more, he proposes a solution.

We have developed an artist in the Class. **Dan Noble**, of Phoenix, Ariz., who is vice chairman of the board of Motorola. Dan donated to the Institute of Electric and Electronics Engineers two of his symbolic paintings done in acrylic on 3 x 4 panels. The works emphasize color, unity and impact of total effect. They will be hung in the I.E.E.E. headquarters. . . . **John Kinnear**, Vice President of Operations, Metal Mining Division, Kennecott Copper Corporation, was made the President of the American Institute of Mining Engineers for 1970. John is also chairman of the AIME Centennial Celebration Committee. As such he will have the responsibility of overseeing all aspects for the 100th annual celebration of the founding of AIME.

A brief quote from **Dave Wright's** last letter: "About the only classmates I run into at all these days are **Bill Roper** and **Jim Maguire**. Bill is now a two-star general with the Corps of Engineers in Cincinnati, while Jim is in charge of personnel here for one of the major divisions of Monsanto. The Wright clan is thriving. Son Dave is at Duke, much interested in football and oceanography. One daughter will be heading for college somewhere in the East a year from now, and the youngest of the crew will be following about four years later."—**A. L. Bruneau, Jr.**, Secretary, Hurdman and Cranstoun, Penney & Co., 140 Broadway, New York, N.Y. 10005

## 39

**Aaron M. White**, was the first to send news of **Albert C. Rugo's** death, apparently from cancer, in April. Al, Course I, had been active in class affairs, chiefly on reunion committees. He was a practicing architect in Boston, and a member of many professional, business, religious, and educational groups. Our condolences to Maureen and to their four daughters and two sons.

Regarding himself, Aaron wrote that he was having satisfaction in arranging for a corporate-wide materials symposium



L. D. Smullin, '39



M. C. Morrill, '39

for Honeywell, and that his experience on the '39 reunion committees was standing him in good stead!

Condolences also to the family of **Rasiklal H. Parekh**, Course X-A. His wife sent word that he had passed on in January, 1970. No details available. He lived at 6931 Ellsworth Ave., Dallas, Texas 75201. In the Alumni Register he was listed as a construction chemical engineer, Fidelity Union Tower, in Dallas.

**Manning C. Morrill**, has been elected Corporate Vice President of W. R. Grace & Co. He continues as Group Executive of the Converted Plastics Group: Cryovac, Formed Plastics Division, and P.D.C. Industries. . . . **Louis Dijour Smullin**, Course VI, Professor and Head, Department of Electrical Engineering, M.I.T., was one of 51 American engineers named to the National Academy of Engineering. He was cited for his contributions to microwave electronics and to engineering education.

Some recent appointments: **Cornelius R. Andrews**, as manager, construction and engineering, for United International Shipping Corporation, a Kaiser organization, in Oakland, Calif. . . . **H. William Ahrenholz**, Course XII, new director of the Engineering Extension, University of Alabama. . . . **H. King Cummings**, to the Board of Trustees, Colby College.

**Joseph G. Mazur**, as president of the White Plains (New York) Hospital Association. . . . **James D. Abeles**, chairman of the executive committee, Purolator, Inc., Rahway, N.J. . . . **Leo A. Kiley**, to general manager, Neutron Devices Department, General Electric Company, St. Petersburg, Fla.—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

## 40

There was no '40 class notes column in the June issue of the *Review* due to difficulties in meeting the deadline for mailing in the material.

I must report with regret the deaths of Captain **Peter R. Lackner** on January 20, 1970, of **Richard S. Mabey** on May 28, 1969, and of **James F. Sheehan** on May 5, 1970. No further information is available at the present time. . . . **Harry Bush's** widow, Marsha, who lives at 580





J. Strickland, '40



W. K. Davis, '40

Arastradero Road, Palo Alto, Calif. 94306, would like to know the wives of classmates in the Palo Alto area. The local Alumni Club has already contacted her.

On April 1 Bob Bittenbender, Bernie Feldman, Jim Baird, John Danforth, Wally Schuchard, Phil Stoddard, Martin Abkowitz, Bill Stern, Ted Kingsbury, John Vanderpoel and Bruce Duffett assembled at the M.I.T. Alumni Fund Office and conducted a telethon for our Class. Over 200 telephone calls were made to members of the Class who had not yet contributed to the Alumni Fund. Pledges were obtained from over half of the callees. Both the number of calls and pledges received were new records in the telethon.

**Bill Bulkley** has been promoted to research associate at the Whiting, Ind. laboratories of American Oil Co. . . . **John Strickland** has joined Tracey, Brunstrom & Dudley, Inc., Consulting Engineers in Seattle, Wash. His new work will be in connection with airport developments in the United States and abroad. . . . **George Kosco** attended the annual Mexico City M.I.T. Club Fiesta.

**Pat Hurley** is coauthor of an article in the January issue of *Science* on "Rubidium-Strontium Relations in Tranquillity Base Samples." . . . **Stanley Stookey** was named 1969 Inventor of the Year by the PTC Research Institute of the George Washington Institute. Stanley is the inventor of photosensitive glass, Pyroceram brand glass ceramics and the co-inventor of photochromic glasses that darken reversibly in sunlight. At present he is director of Fundamental Chemical Research at Corning Glass Works.

**Oliver Fulton**, who is director of Central Planning at Black & Decker in Towson, Md. writes: "Not too exciting news to report. Wife, four children like Maryland Suburbia & Chesap'k Bay sailing more than ever." . . . **Bob MacDonald**, who is director of metallurgy for Newmont Exploration advises those planning to enter a career in mining or metallurgy to include both technical education and training in business and management. He believes that the projected demands for metals and mineral products in the

relatively near future will require not only extractive metallurgical skill of the highest order, but in quantity beyond present realization.

A brief note advises that **Tom Kroner** is still in the gelatin business. . . . **Ken Fox** has been elevated to chairman of Fabric Research Laboratories, Dedham, Mass. . . . **Sam Goldblith** received the Institute of Food Technologists' Nicholas Appert Award on May 26, 1970, for preeminence in and contributions to the field of food technology. Sam's main fields of teaching and food research have been in radiation preservation, freeze dehydration, and microwaves and their applications to food processing. He has published more than 175 papers and has been the editor or co-editor of three texts and reference books relating to foods. Sam and his wife Diana have two children, a son Jonathan Mark, who is a junior in Melrose High School and a daughter, Judith Ann, now Mrs. Richard Clark who resides in Aurora, Ill.

For those visiting Expo 70 this year **I. M. Pei** is architect-coordinator of the Republic of China Pavilion. . . . **Paul Bunke** has just completed an assignment in Kuala Lumpur, Malaysia with General Steel Fabricators for the International Executive Services Corps. Paul's work was on an offshore drilling administration project. . . . **Willard Davis**, vice president of the Bechtel Corp., San Francisco, Calif., has been elected a member of the National Academy of Engineering. He was cited for his contribution to the development of nuclear power technology and its industrial application.

By the time this reaches you the '40 rally will be history. From the early reports, it looks like it was well attended. For those who missed it, will see you at our 35th reunion in 1975.—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, 730-15th St. N.W., Washington, D.C.

## 41

REMINDER: Our 30th class reunion is less than a year away! Due to M.I.T.'s rescheduling of graduation exercises to occur a week earlier than in the past,

our 30th reunion is scheduled for Friday through Monday, June 4-7, 1971. Class president, Ed Marden, has been busy corraling local classmates for staffing necessary committees for this gala affair. To this end, a meeting was held at the Faculty Club on May 21, 1970. The meeting resulted in the following committees being established and committee chairmen selected: Publicity—Irving Stein; Reunion Treasurer—Frederic Watriss; Program (Adults and Children)—Reid Weedon; Entertainment—Leona Zarsky; Sports—John Sexton and Johan Andersen; Commemorative Souvenirs—Mitch Marcus; Registration and Reception—Ed Beaupre; Alumni Day Coordinator—Martin Ernst; Sleeping accommodations and Catering—Walt Kreske; other committee men: Michael Driscoll, John MacLeod, James Mar, George Hite, Harvey Pofcher. You will receive further information and details as they become available. In the meantime, be sure to mark your calendar for the 30th reunion, June 4-7, 1971.

**Frederic W. Watriss** has been promoted to the position of associate treasurer of M.I.T. Fred will continue to work in the management of the investments of the Institute and will be directly concerned with the administration of investment affairs. In cooperation with the Institute real estate officer, he will continue to be responsible for real estate investment activities. As associate treasurer, Fred will have administrative responsibility for the financial aspects of the staff and employee benefit programs and for their continuous improvement. He will serve as the Institute's principal liaison officer with banking institutions which provide custodial, deposit, and other services to M.I.T. Together with the Treasurer and Associate Comptroller, he will supervise the management of Institute funds and their application in support of the operating and capital budgets of M.I.T. Fred serves as secretary of the Investment Committee of M.I.T. Corporation and as secretary and assistant treasurer of the retirement funds. He is secretary of the board of allocation of the Independent Residence Development Fund, Chairman and President of the Northgate Community Corporation concerned with off-campus housing at the Institute, and a trustee and secretary of Technology

Square and its associated trusts. After graduating from M.I.T., Fred served as a research associate in the department of aeronautics and astronautics. He joined the Treasurer's Office staff in 1952 as assistant to the vice president and treasurer. He became assistant treasurer in 1957 and in 1959, recording secretary of the Institute, in which position he continues to serve. Fred also serves as a Corporator and Trustee of the Charlestown Savings Bank and a Corporator of the Boston Five Cents Savings Bank.

**Luke S. Hayden** has been selected to serve as chairman of the "pacesetter" division for this fall's United Fund drive covering Pittsfield, Lanesboro and Lenox, Mass. To qualify as "pacesetter" a company must offer the payroll deduction plan for pledges, record at least 90% of the employees contributing an average of at least \$20.75 each. Luke was instrumental in starting the "pacesetter" division in 1961. In 1963 he was chairman of the drive which broke fund-raising records in that area. In 1967 he was elected president of St. Luke's Hospital and assisted in arranging a merger later that year between St. Luke's and the Pittsfield General Hospital, thus forming the Berkshire Medical Center. Currently he is a governor and member of the executive committee of B.M.C. Luke earns his living as president of the City Savings Bank in Pittsfield and lives with his wife and two younger children, Mimi and Luke 3rd at 140 South Mountain Rd., Pittsfield, Mass.

**Raymond W. Ketchledge** has been elected a member of the National Academy of Engineering which is a private organization established in 1964 to share in the responsibility given the National Academy of Sciences under its Congressional charter of 1863 to advise the federal government, upon request, in matters of science and engineering; to sponsor engineering programs aimed at meeting national needs; to encourage engineering research and to recognize distinguished engineers. Election to the Academy is considered one of the highest professional distinctions that can be conferred upon an American engineer and honors those who have made important contributions to engineering theory and practice or who have demonstrated unusual

accomplishments in the pioneering of new and developing fields of technology. Ray was cited for his technical and administrative contributions to the development of stored-program electronic switching systems. He is executive director of the Indian Hill Switching Division at Bell Laboratories in Naperville, Ill. He joined Bell Laboratories in 1942 and was initially engaged in military development work. He later participated in the development of a submarine cable system and a broadband coaxial carrier system. Since 1954 he has specialized in the development of switching systems and has been concerned with work on memories, switching networks and logic equipment. He was appointed assistant director of Switching Systems Development in 1956 and director of the Electronic Switching Laboratory in 1959. He assumed his present position in 1966. Ray directed the development work on all circuits and equipment for the No. 1 Electronic Switching System which was initially placed in service at Succasunna, N.J. in May 1965. He was in charge of similar work on equipment used in the experimental electronic central office at Morris, Ill. from November 1960 to February 1962. Currently, he is responsible for the development of new electronic switching systems that will provide a variety of useful telephone services for both business and residential customers. Born in Harrisburg, Pa., Ray received his B.S. and M.S. degrees in electrical engineering from M.I.T. He is a Fellow of the Institute of Electrical and Electronics Engineers and a member of the scientific honor society Sigma Xi. He also holds a position on the Illinois Science Advisory Council and has been granted 57 patents for his inventions.

**Milton Sanders** has been appointed to the position of corporate director of data product programs for Conrac Corporation, 330 Madison Ave., New York. The new post carries responsibility for the technical and marketing coordination of all Conrac computer-related product lines. Milton was formerly with Sanders Associates of Nashua, N.H., where he was general manager of the Data Systems Division since 1966. Before that he was New York manager of Auerback Corporation and vice president and general manager, Business Systems Division of



R. Ketchledge, '41



W. Pease, '42

the Teleregister/Bunker-Ramo Corporation where he was instrumental in the development of the telefile system for Dow-Jones and the reservation system for United Airlines.

**John M. Biggs** presented a paper, "Computer Aided Reinforced Concrete Building Design" at the April meeting of the American Society of Civil Engineers. John is a professor of Civil Engineering at M.I.T. . . . **Vincent G. Kling** was among those listed as receiving "Pennsylvania Awards for Excellence" signed by Pennsylvania's Governor R. P. Shafer. Since its establishment in 1966, 27 distinguished Pennsylvanians have been named in a wide range of categories. Vincent is an architect, practicing in Philadelphia.—**Walter J. Kreske**, Secretary, 53 State St., Boston, Mass. 02109; **Everett R. Ackerson**, Assistant Secretary, 831 Cranford Ave., Westfield, N.J.; **Michael Driscoll**, Assistant Secretary, 63 Center St., Nantucket, Mass.

## 42

From the *Indianapolis Star* we hear that **Paul Hotte's** son Bruce, who is a senior at Norwich University in Northfield, Vt. received a certificate of merit from the State of Vermont for his contribution to the young people of Vermont. . . . A note from Dan Hulett, informs us that **Dick Hughes** has been elected a director of the American Institute of Chemical Engineers. . . . Lou Rosenblum writes that **Jim Littwitz** is a director of the Board of Co-Operative Educational Services of Monroe County (N.Y.). Jim is in the Sensitized Paper Production Department of Kodak in Rochester. . . . More info from **Bill McGuigan** who reports that **Jack Flipse**, President of Deepsea Ventures, Inc., has been nominated a director of the Marine Technology Society. As mentioned in last month's notes, Bill is doing consulting in research and engineering in Los Altos, Calif. He is also Vice President of Aquaculture Corporation.

**Milt Platt** has been elected treasurer and a director of Fabric Research Laboratories. . . . **Bill Pease** received the Numerical Control Society's Jacquard Award for his part in pioneering a prac-



tical numerical control system. Bill is Manager of Development at Raytheon's Equipment Division in Waltham. . . . **Harold Adams**, who received his Ph.D. in physical chemistry with our class has been appointed manager at Firestone's Elastomer Structures Division at the Company's Central Research Laboratories in Akron. . . . Among recent publications was **Myron Johnson's** article "Specifying Pressure-Treated Wood with Federal Specs" in the February issue of *The Construction Specifier*.

Minor goldmine from the flaps of Alumni Fund envelopes. . . . **Elizabeth Kelly** is head of the Biology Department at West High School in Pawtucket. She's also working on curriculum planning for health education in the schools and advising the Council on Youth in its fight against smoking. (tobacco, I presume!) . . . **Max Kaplan** has merged his Investment Management Company with Charter Securities Management Corporation in Los Angeles, specialists in growth oriented stock market programs. . . . **Henry Lemaire's** older son Tom will be in Norway this summer with the Experiment in International Living while Henry, wife Connie and other son, Brian, visit in Great Britain and in Switzerland.

More from envelope flaps. . . . **Wilfred Shaw** has been on the Redondo Beach (California) City Civil Service Commission for four years and has been its chairman for two. He is still serving on the National Ski Patrol, wound up last winter season, his 10th with the patrol, by taking a three-day back pack trip into the deep Sierra country. . . . **Frances (Ross) Karlan's** son Dan is finishing his freshman year at Tech, is doing well and enjoys it. Frances apparently has been visiting Cambridge and is amazed at all the changes. However, she's quite unspecific, could be she's talking about the buildings and campus facility development, or other changes, in climate, faculty, students, curriculum, or what? Best wishes for a wonderful summer. Let's hear from you all.—**Ken Rosett**, Secretary, 191 Albemarle Rd., White Plains, N.Y. 10605

## 44

A note from **Jack Barmby** your editor asked that I take over for a month, and give him some rest. He has done such a good job, that he deserves the summer off at least.

A recent article appeared in *Power Engineering* quoting extensively from an interview with **Andrew Corry** who is chairman of the Electric Research Council. Andy has become an expert in the area of underground electrical transmission as a result of his job as assistant to the Executive Vice President, Boston Edison Co. He is optimistic about the opportunities to reduce the cost of underground transmission.

A charming note in the newsletter of the Harvard University Press quotes Count

Rumford as having said in 1798 about his publishers: "Pray take all possible care to have all my publications printed as correctly as possible. It gives me real pain when I discover faults in them; especially such faults as arise from the negligence of Printers." **Sanborn C. Brown** who is listed in my directory as associate dean of the graduate school is editing *The Collected Works of Count Rumford*, which is to be published this month. . . . A note in the *Boston Globe* brings news of a promotion for **Walter Gray** to technical assistant to the vice president and general manager of Honeywell EDP, in Wellesley Hills.

Fortunately we have also received some notes from the fellows who sent them along with Alumni Fund contributions. **Bernie Rabinowitz** reports he has four children, the oldest of which is 19 and a student in the Class of '72 at Harvard. Bernie is the owner of Atlantic Chemical Corp. in Nutley, N.J. He says that he has been active in many community activities, and also very active in Democratic politics in New Jersey. . . . A similar note from **William Tucker** who lives in Berwyn, Pa. advises he started his own manufacturers representative business three years ago—electronics of course. Bill has done good planning since his major principal is a computer memory manufacturer in the Barbados, requiring winter visits. Bill informed us that his oldest son is a freshman at Roanoke, and his daughter and two other sons are still at home. . . . **Alan Rose** also included a note with his Alumni Fund contribution, and it appears that he is seeking the address of the Los Angeles M.I.T. club, which is the nearest to him in Tarzana, Calif. Al, doesn't give any biographical information, and some of the class of '44 in Los Angeles might want to give him a call.

**Louis H. Roddis, Jr**, Course XIII-A, President of the American Nuclear Society, presided at a Symposium on "Engineering with Nuclear Explosives," in January. It is apparent that Roddis is a very astute leader—he held the meeting in Las Vegas. This view is confirmed by the fact that Lou was elected President of Consolidated Edison in November 1969. Roddis joined the company as vice chairman of the board in April. He had been director of nuclear activities for the General Public Utilities Corp., one of the four companies in the G.P.U. system. We are indebted to Carole Clarke, Secretary of the Class of 1921 for the clipping from the *Asbury Park (N.J.) Evening Press*.

As part of our planning for the M.I.T. Club of Washington's January meeting, I had a chance to talk with **William C. Cooley**. Bill has formed a new company, TERRASPACE, Inc., to conduct terrestrial engineering, particularly in the fields of tunneling, mining, and excavation using high-pressure water jets. His office is in the same building as his apartment so he doesn't have to worry about commuting.

A news release from Battelle Memorial Institute of Columbus, Ohio announces



J. B. Weaver, '44

the appointment of **Spencer Schilling** as chief of metals, electronics, and manufacturing economics research at the Columbus laboratories. He will be concerned with marketing research, natural resource allocation, and raw materials utilization. . . . **Jim Weaver**, director of corporate planning and appraisal for Atlas Chemical Industries, Inc. of Wilmington, Del., received the "Good Government Award" from the Committee of 39, a Delaware organization dedicated to better government. Jim founded and is board chairman of CROND, INC. (Computer Research on Nonpartisan Districting) which is a volunteer organization that has pioneered in the use of computer techniques to establish constitutional legislative districts in a nonpartisan manner. Jim's company worked on the legislative reapportionment of Delaware in 1967-1968 and on the redistricting of New Castle County, Del., in 1969.

A list of newly appointed members of the National Academy of Engineering includes the name of **James R. Macdonald** who is vice president of corporate research and engineering, and director, Central Research Laboratories, Texas Instruments Inc., Dallas. His citation is for "leadership in research, development, and engineering, and personal contributions to electronic circuits and devices."

When I took on this short assignment I thought that I would be able to use some of my travel time to give several of you a call. I didn't have any trips planned, except one to Chicago for the Design Engineering Exposition. While in Chicago, I was able to get to see Dorothy and **Lew Tyree**. Dorothy was very non-committal when I asked her for class news, and would only comment on the status of the tulips and lilacs in the yard. Apparently she has found out that reporters write too much. Lew however did say that he has been quite busy with his new cryogenic pumping devices and has had to go to Puerto Rico and Peru recently. Lew is an educational advisor and we both compared notes on the candidates we have been seeing for the past several months. He has





E. R. Kretzmer, '46

had some successes, and is happy to send the fellows from his area to the Institute. I find this activity very rewarding and would recommend it to any one who would like to try his hand at it.

A clipping from the Chesterton, Pa. *Tribune* advises that **Bill Ritterhoff** who has just returned to the area from Burns Harbor, Ind., has been appointed to vice president of Bethlehem Steel Corporation. He has been with Bethlehem since 1948 when he joined their Sparrows Point, Md. plant.—**Paul M. Heilman**, Assistant Secretary, 30 Ellery Lane, Westport, Conn. 06880; **John G. Barmby**, Secretary, IITRI, 1825 K St., N.W., Washington, D.C.

## 46

The response to a recent post card mailing I sent has been quite good. I certainly would appreciate it if you other classmates would also answer our request. Nearly all of the information in these notes came from the mailing.

**Bob Cuccioli** graduated in Course I in 1946 and soon joined a New York organization as a consulting engineer in the field of highways and bridges. Bob remained in this employ until 1952 when he joined the firm of Blauvelt Engineering Company, consulting engineers of New York City. He advanced in experience and position until 1966 when Bob became a partner in the firm. Bob and his firm have been responsible for the design and supervision of construction of many major projects of which they are quite proud. Bob and his wife, Ann, have four children ranging in age from 12 to 23 years. The oldest daughter, Barbara, graduated from Villanova University with a B.S. in nursing. The second daughter, Joan, is a sophomore in art teaching at Wagner College in New York. The third Cuccioli daughter, Patrice, is in her second year of high school and their son, Robert, is still in elementary school with plans for a future in science.

**Samuel Gusman** has written from his home near Columbus, Ohio. Sam has

been with one company since 1950, Rohm & Haas, and is now president of one subsidiary, Warren-Teed Pharmaceuticals, and chairman of another, Consolidated Bromedical Laboratories. Sam and his wife, Carolyn, live in Worthington, a suburb of Columbus.

**Sterling Bushnell** has recently completed 10 years with Misco Division of Howmet Corp. in Whitehall, Mich. He is project engineer, principally working in product engineering making investment-cast blades and vanes for aircraft-jet engines. This summer the Bushnell family will be moving to England as Sterling is to revitalize a small foundry his company has purchased in Newton Abbot in S. Devon. The Bushnells have four children; the oldest boy is married, the second graduates from high school this June and the other two are 11 and 14 years old. . . . **Jim Corbett** is director of advanced concepts at Grumman. Since graduation Jim worked with Grumman, TRW, Raytheon, and then back to Grumman. Jim, his wife Frances, and three children live in a beautiful nine-room home overlooking Northport Harbor in Centerport, N.Y.

**Dick Ballman**, his wife Jane and their four children, live near Pensacola, Fla. Dick is a research scientist in the lab adjoining the Monsanto nylon plant in Pensacola. The Ballmans have been in Florida since February of 1970. For the previous 23 years Dick had been working at the Springfield, Mass. plant. Dick reports all is well with them if you do not count the hazards and obstacles to aging gracefully. . . . A flying forty-sixer is **Dave Moyer** in his Cherokee Six. Dave flies his family around whenever he can and especially enjoys instrument flying. Dave is executive engineer, ignition and mechanical products, especially involved in computer applications for the Ford Motor Co. He has been with them for four years, having previously been with MITRE. The Moyers have four children, one boy at Yale, one at the University of Michigan, and two girls in Ann Arbor High School, Ann Arbor, Mich.

**Ted Church** has travelled about as far from M.I.T. as anyone in the Class, living in Albuquerque, N. Mex. Ted was employed at the Los Alamos Scientific Lab in Albuquerque from 1947 through 1949. Since 1949 Ted has been with Sandia Laboratories in Albuquerque and is now manager of the product test development department. His work has involved him with other A.E.C. laboratories, G.E. in St. Petersburg, Bendix-Kansas City, United Kingdom lab and other English laboratories. Ted and his wife, Elizabeth, have two children. Malcolm is at New Mexico State University, and Anne is at the University of New Mexico. Ted expressed the opinion that it appears M.I.T. is becoming too large and perhaps several smaller M.I.T.'s scattered throughout the U.S.A. would prove more worthwhile. . . . **Robert B. Boomer** is now Dr. Robert B. Boomer,

and has joined the department of ophthalmology of the Lutheran Hospital in LaCrosse, Wisc. Bob was in the V-12 program at M.I.T. and after leaving M.I.T. he attended the University of Idaho and the medical school at Harvard University. He interned at the Los Angeles General County Hospital where he met and married another intern, Dr. Ann Paulsen. In 1952 Bob served as a Navy flight surgeon in the Far East theater and later at the Naval Air Station at Moffett Field, Calif. Since 1958 Bob has been in private practice in Palo Alto, Calif. Dr. and Mrs. Boomer, and their four children, live in Onalaska, Wisc.

**Ernest R. Kretzmer** who received his M.S.E.E. at M.I.T. in 1946 and his Sc.D. degree in 1949 has been promoted to director of the Data Communications Laboratory of the Bell Laboratories in Murray Hill, N.J. In his new position Dr. Kretzmer will be responsible for the development of new methods and apparatus for the transmission of data signals over various Bell System communication channels. Dr. Kretzmer, his wife Suzanne, and two children live in Holmdel where he is a member of the Holmdel Board of Education. . . . **Robert M. Adams**, anthropology professor and director of the Oriental Institute of the University of Chicago has been elected a member of the National Academy of Sciences at its 107th annual meeting in Washington in May, 1970.

It is our sad task to report the deaths of two classmates. **Jack A. Laspada**, who earned a master's degree in naval construction and engineering, died April 2, 1970 in Walnut Creek, Calif. after a lengthy illness. Mr. LaSpada retired as a commander from the navy in 1959 and was with Aerojet-General Corp. in San Ramon for the following ten years before joining the Bechtel Corp. He is survived by his wife, Diane, and two college-age children. . . . **Hector J. Cardenas** died in a car accident in Monterrey, Mexico in September, 1969. We have no other details of this unfortunate event.—**Russ Dostal**, Secretary, 18837 Palm Circle, Cleveland, Ohio 44126

## 47

This beautiful holiday weekend finds us trying to play a maximum amount of golf and as I start these notes the first clipping concerns **Al Richardson** with whom I played a couple of years ago on the golf team at school. Al coauthored a paper describing an optical infrared concept having applications to a simple, low cost pilot warning indicator. He is now with NASA Electronics Research center in Cambridge having previously done work with the Edison Electric Institute and M.I.T. on high voltage transmission lines. Al I trust that you are scoring better than I am at present.

The National Academy of Sciences announced the election of 50 new members among whom was **Ed David** now execu-



G. Collett, '49



B. LeVine, '49

tive director research in communications systems Bell Telephone Labs. . . . **Roger Holcomb** manager of planning and engineering in the American Oil manufacturing department received in behalf of his company the Industrial Professional Development award given by the Indiana Society of Petroleum Engineers.

A note from **Dick Knight** advises that he is now with Broan Manufacturing Co. in Hartford, Wisc., as vice president of operations. Broan makes range and barbecue hoods, home ventilating fans, bathroom heaters and door chimes. Watch that quality control and engineering Dick. We have a new brand X barbecue hood that is giving us fits, so with a good product you should beat one competitor that I know of. . . . **Bob Slusser**, now a project engineer with Union Carbide in South Charleston, W. Va., recently coauthored an article in *Chemical Engineering* on the design parameters of process condensers and reboilers.

**Loring Mitten**, Professor of Industrial Engineering at the University of British Columbia was recently honored by being named a Fellow of the American Institute of Industrial Engineers. . . . With that it's back to the country club. Oh if I could only hit those irons.—**Dick O'Donnell**, Secretary, 28516 Lincoln Rd., Bay Village, Ohio 44140

## 49

We have two news items from Alumni Fund envelopes this month. **Adrian E. Johnson, Jr.** writes, "Became full time member of L.S.U. Department of Chemical Engineering with rank of Professor on September 1, 1969. Also have established a consulting practice with Petroleum and Petro-Chemical Industry in Computer Process Control. Family includes wife, Elizabeth Stirling, and three daughters, Lynn (16), Anne (13), and Pamela (12)." . . . **Thomas J. Whitlow** reports, "Since leaving M.I.T. in 1949, I served in many research and development activities in the Navy, including the Naval Research Laboratory and the Bureau of Naval Weapons, Washington, D.C. I retired as a Commander in 1961. The son who was born to us at Chelsea while I was attending M.I.T. grew to

manhood in many places around the world and died recently in action in a remote corner of the world, Vietnam. We still have one son (no daughters) who is attending San Diego State College, Calif. Since retiring from the Navy, I have worked at the Hughes Aircraft Company in Culver City, working up to a Project Manager. I presently work on Tactical Systems in the Aeronautical Systems Division, Aerospace Group. Best regards to all classmates wherever they are."

News on promotions, job changes, etc. starts with **Groff Collett** (M.S., Course XV), vice president, corporate development, Consolidated Papers, Inc., Wisconsin Rapids, Wisc. Groff has been elected to a four-year term on the board of directors of the Graphic Arts Technical Foundation, Pittsburgh, Pa., a non-profit, scientific, technical and educational organization serving the international graphic communications community. . . . From Chicago, Campbell Soup Company announces that **David J. Esson** is now technologist, Agricultural Department. With Campbell since 1949, David's role of "technologist" has moved him around the globe, with stops in Ohio and New Jersey as well as five years at the King's Lynn plant in England.

**A. Scheffer Lang** is now Visiting Professor, with rank of Professor, in Civil Engineering at M.I.T. . . . **Burton A. LeVine** has moved from Singer-Librascope, where he was a staff engineer and mathematician, to Planning Research Corporation in Los Angeles as a senior associate in the Programming Sciences Department, to provide problem analysis, numerical procedures, and program flow diagrams for complicated simulation problems on digital computers.

Finally, alphabetically last but not least, Response Analysis Corporation, Princeton, N.J., announces with pleasure that **Leonard F. Newton** has joined their management and professional staff as vice president. Congratulations all.

One of our classmates recently joined a select group in a *New York Times* news item on April 19. Headed "6 Ex-U.S. Officials Earn Top Pay in Defense Work,"

it included **Henry S. Rowen**, who as president of the Rand Corporation was listed as earning an astronomical sum (reminder to Ira Dyer as 25th Fund Chairman). He joined Rand after six years of government service, first as Assistant Secretary of Defense and then as Assistant Budget Bureau Director. It can't be much fun to have your salary under attack in the Senate, Henry, but congratulations on your obviously successful career. . . . Happy Holidays to all; that is, have a good vacation this summer.—**Frank T. Hulswit**, Secretary, 77 Temple Rd., Concord, Mass. 01742

## 50

The National Academy of Sciences, at its 107th annual meeting here this week, announced the election of 50 new members in recognition of their distinguished achievements in research. Among the new members is **Bernard Flood Burke**, 10 Bloomfield St., Lexington, Mass., who is Professor of Physics. A radio astronomer, he was born in Boston, graduated with us in 1950 and received his Ph.D. degree from M.I.T. in 1953. He was at the Carnegie Institution in Washington from 1953 to 1965 before returning to M.I.T. as a member of the faculty.

Digital Equipment Corporation president, **Kenneth H. Olsen**, announces that D.E.C. is planning to introduce a lower-priced version of its PDP-8 computer. He declined to say what the price would be or when the new model would be made commercially available. Orders from elementary schools have tended to be for \$8,500 computers to be used by pupils at the 7th and 8th grade levels. "The future for small computers is just starting," he said. Asked whether D.E.C. would contribute computers to schools, as it did a \$120,000 computer system to M.I.T., Mr. Olsen replied, "At our prices, we are giving them away."

**Norton Belknap** left Australia in mid-1969 where he was chairman and managing director for Esso, Australia. After a tour of Japan, South Asia, and some of Europe, he took up residence at 12 Chester Square, London SW1. He is presently a vice president of Esso, Europe.





R. F. Anderson, '50

**Robert F. Anderson** has been appointed vice president-planning and administration, for Honeywell's Electronic Data Processing Division in Wellesley Hills, Mass. He will head the newly designated Planning and Program Management Division. Mr. Anderson has been with E.D.P. Division since 1956, starting as a sales engineer. Before joining Honeywell, he had been an industrial engineer in the film department of E. I. duPont de Nemours & Company. Mr. and Mrs. Anderson have eight children and reside at 74 Country Dr. in Weston, Mass.

The Ohio State University Board of Trustees included the appointment of Professor **William T. Morris** of the industrial engineering faculty to the chairmanship of that department, effective April 1. Professor Morris, on the Ohio State faculty since 1954, has specialized in the application of mathematical theories to the development of management models. He is the author of eight books, including *Management Science in Action*, which was honored by the Academy of Management in 1963. He has taken in a number of industrial and governmental research projects and has served as consultant to several large companies. In 1965 he received one of the university's five annual Alumni Awards for Distinguished Teaching. He has his M.S. (1953) and Ph.D. (1956) from Ohio State.

In a former automobile dealer's garage just across from its main plant in Springfield, Vt., Jones & Lamson Division of Waterbury Farrel has established a school for users of its N/C equipment. Local residents who, until a year ago, came here for grease jobs and tire changes wouldn't recognize the interior of this 80 x 80-foot two-story building. The atmosphere is plush, as befits an area containing well over \$1 million worth of the latest machine tools built by J & L. The training schedule, directed by 20-year J & L employee, **Charles P. Puksta**, runs 8:00 to 5:00 for one (sometimes two) week periods with enough evening skullwork assigned to help students forget the dirth of entertainment in town. Already, Mr. Puksta is finding it necessary to schedule trainees months in advance in order to keep classes small.

We were very sorry to learn of the death of **John W. Nickerson** who passed away on October 20, 1969. The sincere condolences of his fellow classmates are with Mrs. Nickerson.

The Cooks are looking forward to moving into M.I.T.'s new MacGregor dormitory when it is completed this summer. They expect to have a nice time as housemaster and family. Their oldest daughter, Nancy, now a freshman at M.I.T., will probably live with them, making MacGregor a "slightly" coed dormitory. . . . An important recent advance in motor prothesis is an artificial elbow developed by Professor **Robert W. Mann**. Professor Mann uses myoelectric detectors in residual muscles to pick up not only information from the efferent nervous network that transmits from the brain to the limb, but also information from the afferent system that feeds information back to the brain. This feedback indicates to an amputee the position of his elbow without his looking at it. More than 20 such elbows are now being fitted at clinics in the field.

**P. G. Dayton**, Course V, has written an article for the February 13, 1970 issue of *Science*, "Placental Transfer of a Substituted Pteridine from Fetus to Mother."

An optical radar pilot warning indicator has been developed by **Richard T. Daly**. From 1954 to 1956, Dr. Daly directed the cesium atomic frequency standard development at National Company, Inc., Malden, Mass. From 1956 to 1967 he directed the Quantum Electronics Department at the TRG Division of Control Data Corp., Melville, N.Y. and in 1967 became president of Quantronix Corporation, Smithtown, N.Y. He holds a current commercial pilot certificate with instrument rating. Dr. Daly is a member of the American Physical Society and Sigma Xi.—**John T. McKenna**, Secretary, 2 Francis Kelly Rd., Bedford, Mass. 01730

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You all should write more news to our class secretaries and this particular assistant secretary should write your news up faster. I will if you will.

**Roger H. Baumann** lives in Winchester, Mass. with his wife Priscilla and their three children. He is a professor in the Electrical Engineering Department at Lowell Technological Institute.

**Robert O. Bentley** is with Robert F. Hyland and Sons, Inc. in Rochester, N.Y. He and his wife Marion have two children. . . . **Deane A. Beytes**, his wife Beatrice and their four children (ages 24-6) lived in West Palm Beach, Fla. a year ago. Dean was with Pratt and Whitney Aircraft at their Florida Research and Development Center. He owned up to no particular activities but admitted enjoying golf.

Professor **Amar Bose** is the first occupant of the LeBel professorial chair at the Institute. The Chair has been established in the Electrical Engineering Department at the request of Clarence LeBel, Class of '26. M.I.T.'s Dean of Engineering, Ray Bisplinghoff, in announcing the appointment stated that it would broaden the department's activities in the fields of audio engineering and acoustics. Amar has a rather illustrious background: He has been a professor at M.I.T. since 1956, became a full professor in 1966, held a Fulbright fellowship in the National Physics Laboratory and at the Indian Statistical Institute in New Delhi and Calcutta, India respectively, received an award as the outstanding teacher 1963-65. He has written many papers and holds many patents in the field of acoustics.

**Charles Elliott** chaired the Computer Symposium of the National Technical Conference of the Illuminating Engineering Society in Boston. Several of the authors illustrated their presentations with time-shared computer terminals.

**Mark Franklin** still lives in Monterey Park, Calif. He has obtained his stockbroker's license and started his own import-export and international finance company called International Resources Exchange. Should I say it: I hope import-export is better than the stock market!

**Herb Graham** and his family were kind enough to send us a copy of their Christmas letter. In it we were told that the Grahams were sent to Florida by





G. Maloney, '55



I. Elman, '56

TRW Systems so Herb could head a study of high speed ground transportation from Miami to the new and controversial jetport in the Everglades. He has found the work challenging and his family has found living in Florida interesting and exciting. They were among the lucky ones who saw Apollo 11 start on its journey live and not on TV.

**Raymond G. Gruwell** had been in Germany since 1966 at the Frankfurt office of Ralph M. Parsons Co. He is presently engineering manager of a fuel oil desulfurization project in Aruba in the Netherlands Antilles. Ray, Iris and their son thoroughly enjoyed Frankfurt and their travels through Europe. . . . **Jerome Kirk** dropped us a note from North Hollywood, Calif. He is now self-employed as an artist sculptor. Last October he had a one-man exhibition of mobiles and stables at the Maxwell Galleries in San Francisco. It took him fifteen years to make the transition from engineer to creative artist. He is presently completing his second major commission, a twenty-five-foot stainless steel outdoor mobile for Connecticut General to be installed at Union Bank Square in Los Angeles. Bravo! . . . **Anthony E. Mirti** has been named division vice president of Norden Division of United Aircraft Corporation, Norwalk, Conn. He will be responsible for program management and contracts administration of Norden activities. Tony, Rose and their three youngsters live in W. Hartford, Conn.

**Lee M. Rohde** is with IBM at Pleasantville, N.Y. doing management systems work. His main outside activity is as a craftsman in wood. He has a collection, "Objects, USA" which was at the Smithsonian at the time he wrote to us. . . . **Irving I. Schupak** operates a lumber and millwork company in New York City. He also designs millwork. . . . **William E. Spicer** writes from a new address in Stanford, Calif. He is a Professor of Electrical Engineering and Material Science at Stanford University. He enjoys solid state physics and stamp collecting (did I miss something?) . . . **W. J. Sullivan** is manager of international airlines analysis in commercial sales for the Boeing Co. . . . **Roy Weinstein** writes from Stanford that he has a Guggenheim Fellowship and a N.S.F.

Fellowship. His permanent address is still at Northeastern University in Boston. . . . **John J. Welch, Jr.**, previously vice president-manager of LTV Aerospace Corp.'s Missiles and Space Division has been named chief scientist of the USAF.

**Robert F. White** is now the design engineering manager of the Electric Boat Division of General Dynamics. Bob and Eleanor have four children ages 14-8 and live in Westerly, R.I. . . . **Robert P.**

**Whittier** has completed fifteen years with Monsanto. He has transferred to the textile division as project development manager, commercial development. He and his family enjoy living in St. Louis and vacationing in New England. . . .

**Albert L. Zesiger** wrote a note containing useful information for all. He found a new road to the top. He recently purchased a forty-year-old investment advisory firm, BEA Associates, Inc. and is now the president. See how easy it is? The firm manages pension funds and individual accounts on a discretionary basis. They handle accounts totaling several hundred million dollars.

All of us wish all of you a very pleasant summer. We look forward to joining you again in the fall. As we take leave, we would like to inspire you into action on two accounts: first, to send news and second, to remember that 1971 is the year of our 20th, that's right, 20th reunion! Jay Rosenfield, 3 Bartlett St., Marblehead, Mass. is the Chairman. Send him your thoughts.—**Marshall Alper**, Assistant Secretary, 1130 Coronet, Pasadena, Calif. 91107; **Paul G. Smith**, Assistant Secretary, 11 Old Farm Rd., North Caldwell, N.J. 07006; **Walter Davis**, Assistant Secretary, 346 Forest Ave., Brockton, Mass. 02402; and **Howard L. Livingston**, Secretary, 358 Emerson Rd., Lexington, Mass. 02173

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The fifteenth reunion is still a thing of the future as we write these notes; we hope to give you a full report on that event in the first fall issue. This spring we were represented at another reunion of sorts, the annual M.I.T. Mexico City Fiesta, by **Guido Guzman**, M.S., who according to our latest information (1967, alas) is

assistant plant manager at Tetraetilo de Mexico S. A. in Mexico City. . . . **Dick and Ella Gardner** and Andrea and Paul (4 and 2) had quite a fling in April and May in Europe (mainly Italy, several days in Switzerland, then Paris, even a day in Iceland en route). A card from Florence at about the midpoint of their journey reported that all was going well; they were "looking forward to Venice, where we won't have to play 'dodge 'em.'"

Keeping up with **Dick McCammon** is almost more than we can do; having just reported one address change we received another, this one to the Geology Department of the Chicago Circle Campus of the University of Illinois. . . .

**Antony Merz** writes that he was expecting to receive his Ph.D. in aeronautics/astronautics from Stanford this spring and to remain in the San Francisco area. . . . At M.I.T. two of our classmates become full professors on July 1, **Charles Ladd** in civil engineering and **Gilbert Strang** in mathematics; **Robert Kolenkow** will become Associate Professor of Physics.

**Russ Meyerand**, director of research at the United Aircraft Research Laboratories, recently addressed a symposium at M.I.T. sponsored by the Commission on M.I.T. Education. The symposium was concerned with manpower supply, need and utilization of scientists and engineers in view of recent government cutbacks in research and development. . . . In April the election of **Allen Wahlberg** as assistant treasurer of the Turner Construction Co. was announced by the main office in New York City. In addition to his new responsibilities Al, who lives in Waldwick, N.J., will continue to direct the cost department functions throughout the company. . . . **Gerald Maloney** was elected vice president-finance of the American Electric Power Service Corp. and a vice president of each of the seven operating utility companies of the AEP System in April. He will serve as chief financial officer for the seven-state system while retaining his present duties as controller of the corporation. Gerald and Kay and their three sons live in Madison, N.J.

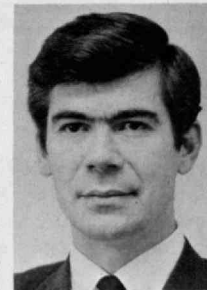
An interesting article in the March issue of *Engineering Education* was **John**



R. Shopf, '56



G. Somekh, '56



J. Psarouthakis, '57

**Lindenlaub's** description of audio-tutorial instruction techniques he has been using in a senior laboratory course in the School of Electrical Engineering at Purdue. The method combines audio tapes, which the student can use at his own pace, with supplementary notes and equipment and is recommended *per se* as an effective teaching method and as a training opportunity for instructors interested in transition from present teaching methods to the more automated methods of the future.—Secretaries: **Mrs. J. H. Venarde** (Dell Lanier), 16 South Trail, Wilmington, Del. 19803; **L. Dennis Shapiro**, Aerospace Research, Inc., 130 Lincoln St., Boston, Mass. 02135

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**Curt Burrowes** is president of a new firm—Burrowes Research—in West Concord, Mass. The company manufactures electrostatic and optical image transfer devices used in information storage and display systems. . . . **Irving Elman** has been elected president of the Tubex Corp., an affiliate of Copper Range Company. . . . **Marc Forest** has been on the move with General Motors overseas—Germany, Mexico, the United States and now back to native France as general superintendent-planning and maintenance in the new automatic transmission plant in Alsace. The Forests also have three boys who have been treated to this tour of the western world.

**Larry Jacowitz** was manager of Space Station activities for IBM's Space System Center from 1967 to mid-1969. Since then he has been manager of Space Shuttle Systems including data management display and control checkout subsystems. . . . **Tom Jones** is one of Eastman Kodak's employees cited by NASA for his work on the Apollo program.

A cryptic note from **John Morefield** indicates he visited Finland and Russia in May. . . . **John Mulholland** is senior structural engineer with National Accounting Division of Portland Cement Association in New York. John, wife, two daughters and son live in New Jersey.

**Bob Santos** is assistant vice president of

NET&T and is responsible for programming and data processing. Outside, he is planning a cross-country tour in a camper. . . . **Dick Shopf** has been elected president of New Park Mining Co., a diversified natural resource company listed on the American Stock Exchange. . . . **George Somekh** has been named research engineer at the Chemicals and Plastics Department of Union Carbide's Tarrytown Research Center. George's specialty has been inventing multipurpose extraction processes. . . . **Joe Wauters** has been named assistant vice president of Arkwright-Boston Insurance and is regional sales manager of the mid-Atlantic region. We also find that Joe has a wife and two daughters.—Cosecretaries: **Bruce B. Bredehoff**, 3 Knollwood Dr., Dover, Mass. 02030; **T. Guy Spencer, Jr.**, 73 Church St., Weston, Mass. 02193

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Here goes with the last news for this volume of *Technology Review*. . . . From **Marc Richman** we received the following letter: "I have been reading your column regarding the activities of our fellow classmates with interest over the years and have finally come up with something worthwhile to write to you about my own affairs. Since receiving my Sc.D. from Tech in '63, I have been on the faculty of the Division of Engineering at Brown. I have just been promoted to Professor of Engineering and have received the 1969 Outstanding Young Faculty Award of the American Society for Engineering Education. I hope that you and all of the others from the class of 1957 are in good health and will continue, through the years, to let us all know what's going on." . . . **John Currie** has been named assistant dean of engineering administration. The news release giving this information provided this biographical data: "Mr. Currie received the bachelor of science degree from M.I.T. in 1957 and the master of science degree in 1963. He was a research assistant and an instructor in civil engineering and took graduate courses in construction management. He worked for United Engineers and Constructors, Philadelphia; Cabot, Cabot and Forbes, Boston, in various management positions, before returning

to M.I.T. three years ago as assistant to the vice president for operations. He is a member of the American Society of Civil Engineers and Sigma Xi. He lives in Needham, Mass., with his wife and three children."

**John Psarouthakis** has been elected vice president, corporate technology and planning for Masco Corporation, manufacturers of single handle faucets, environmental and other products for the home and cold extruded and other precision industrial components. Before joining Masco, John was director of technology for Allis-Chalmers. After obtaining his M.S. at Tech he continued his studies at the University of Maryland where he received his doctorate in engineering.

Recent promotions at Tech included **Ed Roberts**, (Sloan School), **Alar Toomre** (Mathematics), and **Laurence Young** (Aeronautics) to Professor, and **John Christian** (Civil Engineering) to Associate Professor. . . . **Thomas Dwyer** has been appointed plant manufacturing engineer at the Paden City, W. Va., plant of Corning Glass Works. Tom has been a senior engineer in forming research since joining Corning in 1967. . . . **Carl Hagge** has been appointed program manager by American Science and Engineering Inc. of Cambridge.

In connection with an article in a trade magazine, the following biographical sketch of **Alan Borstein** appeared: "Alan Borstein, a graduate of Massachusetts Institute of Technology and the Harvard Business School, joined Boise Cascade Building Company in 1967. He was formerly civil engineer for Esso Research & Engineering Company; was associated with the Catalytic Construction Company; held the positions of assistant to the senior vice president, assistant general manager, and assistant to the executive vice president with Levitt & Sons; and was founder of the construction firm, Woodview at Cinnaminson, Inc. At present, Borstein is general manager with Boise Cascade Building Company. His former Boise appointments were special assistant to R. A. Watt and director of administration."

**Renata Cathou** wrote us a short note to say that the Arthritis Foundation has





The Morefield brothers, Fred, '57 (left) John, '56 (right) in Finland.

awarded her a Senior Research Investigatorship with a tenure of five years. Renata adds: "I feel very lucky because only one or two were awarded this year, and there were many applicants from all over the U.S." . . . **George Malaney** is presently Professor of Environmental Biology in the Department of Environmental and Water Resources Engineering at Vanderbilt University. . . . **Peter Kotzer** advises that he has been appointed as Lecturer at Western Washington State College through 1971. He is conducting a high energy research program using cosmic ray cloud chamber data in search of quarks and also is preparing a course on physics and the human psyche. . . . **Patricio Ferrara** and his wife, Julie, were among those who attended the 1970 MIT Mexico City Club Fiesta. . . . Born to Susan and **Arthur Aznavorian**, a son, on April 15. . . . That's all for a few months. We're settling in for a summer of visitors. Our latest was my brother, John, class of '56 (see photo) who with his wife Mary Anne spent 10 days with us following a trip to Moscow and Lenin-grad.—**Frederick L. Morefield**, Secretary, Tiirasaarentie 17, Lauttasaari, Helsinki 20, Finland

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While reading the Spring 1970 issue of *Apartment Ideas*, we discovered Sheri and **Jim Benenson** enjoying an elegant dinner in their New York apartment (page 78). As many of you may know, Jim has formed his own investment banking firm of James Benenson and Company, Inc. They have been in operation for nearly two years now and, according to Jim, would "welcome M.I.T. graduates as customers!"

In May, a telethon on behalf of the M.I.T. Alumni Fund brought together class members Dan Holland, Bob Hausslein, Pete Ricupero, Marty O'Donnell, Glen Strehle, Bob Jordan—who was in Boston on business, Jeff Ingraham, and your secretary. During the evening, the group was able to talk with a large number of class members throughout the country to renew acquaintances in some cases, and even to receive some additional pledges for the Fund.

**Jerry Flower** has been appointed as-

sistant vice president and director of financial planning-finance operations for Associates Financial Planning and Control Company, Inc. Prior to joining Associates, Jerry was vice president of corporate planning for a New York based securities firm and had previously served as planning manager for General Finance Corporation. He received an M.B.A. from the University of Michigan.

**Steve Tannenbaum** was honored at the recent Institute of Food Technologists annual meeting in San Francisco where he received the Samuel Cate Prescott Award for research in the area of food science and technology. This award is specifically for outstanding research by scientists under 35 years of age. Steve is currently an associate professor at M.I.T. in the Department of Nutrition and Food Science where his research has centered on food chemistry as applied to new sources of foods, development of new sources of calories and proteins, and stability of foods.

This spring at M.I.T., **Vic Teplitz** was promoted to associate professor in the Department of Physics. . . . **Malcolm Johnson** is at the Bendix Research Laboratories in Southfield, Mich., where he is engaged in the development of instrumentation based on ultraviolet radiation interactions. . . . **Jason Taylor** has been appointed editor of Wang Laboratories, Inc., monthly publication, *The Programmer*. In this position he will be responsible for editing and writing technical articles for this journal.

**John Griffith** has recently been appointed to the advisory board of Chemical Abstracts Service. John is employed at IBM's Research Division in Yorktown Heights, N.Y. . . . **David Baldwin** is presently associate professor of applied science at Yale University and is moving this summer to the Sherwood Physics Division of the Lawrence Radiation Laboratory in Livermore, Calif.

For the past two years **Fred Fisher** has been director of construction for Zayre Corporation, as he says, "building stores, shopping centers and warehousing facilities throughout the country. I do more commuting to and from Logan Airport than to work. My wife and I have two sons, 6 and 8 years old." . . . **Robert Ricci** was recently appointed chief of the flight computer branch at N.A.S.A.'s Electronics Research Center in Cambridge, Mass. Bob and Elizabeth have a daughter, Linda Marie, who recently celebrated her first birthday.

**James Galbraith** has moved to Dallas, Texas, to join Mobil Research and Development Corporation as a senior research geophysicist. . . . **Richard Dalven** spent the past academic year as a visiting research associate in the Physics Department at the University of California at Berkeley. He has been on a leave of absence from RCA Laboratories in Princeton, N.J. . . . **Ronald McCauley** writes that he is currently a group leader in the Medicinal Chemistry Section at

Wyeth Laboratories in Radnor, Pa.

**David Bentley** reports that his wife, Sue, has presented them with their fifth child and second son this past spring. They are living in Westfield, N.J., where he is working for National Starch and Chemical Corporation as a project supervisor. In addition, he is serving as president of the Westfield Volunteer Rescue Squad which provides first aid and ambulance service to the community. . . . **Ritchie Coryell** writes that he is "working as a systems engineer at JPL in the area of remotely controlled roving vehicles for the moon or Mars. Our family consists of two sons, Mark 7 and Heath 6." . . . Have a good summer and please be sure to give Toni or me a call should your vacation plans bring you to one coast or the other.—**Michael E. Brose**, Secretary, 199 Sudbury Rd., Concord, Mass. 01742; **Antonia D. Schuman**, Assistant Secretary, 22400 Napa St., Canoga Park, Calif.

## 60

Hi out there in Magazineland, this is your old Uncle **Mike (Padlipsky)** substituting for just this one chunk of class notes in order to pay off an election promise. No, I haven't won any elections lately; the thing is that I promised Linda that I'd do a column if she'd accept nomination for re-election as Class Secretary, so here I am. (In case you're still wondering how I got into the loop, it's like this: good old Hurst conned me into being chairman of the Class Officers Nominating Committee, you see, and the hooker in it all was that if I couldn't convince Linda to go on with the excellent job she's been doing, or find someone else if she couldn't be prevailed on, then I'd have to resign from the committee and be the nominee for Secretary myself. So you see. . . .) By the time this is published, I trust that we will be all set for another five years' worth of much better notes than I have to offer, but for now let's get on with it.

To start on a personal note (not ego, you understand, merely an unwillingness to make anybody jealous of anybody else's getting first mention), I might point out that in flipping through the back copies of the notes in Linda's folder of such things I noticed that I was reported to have returned to the Institute as a system programmer for the Comp Center at the time of our fifth . . . er, first . . . er—at the time of the reunion commemorating the fifth anniversary of our graduation. (Well, most of us anyway; I did know of at least two classmates who couldn't make the reunion because they wanted to attend Commencement and pick up their S.B.'s, however.) The intervening five years may be summarized by my simply telling you that I'm still at the Institute, but now I'm a system programmer at Project MAC. But, then, I'm not sure that it's been all that great a five years for the entire world either.

Onward and . . . onward: **Tom Cover** sent



the following letter to Linda: "Here is a blurb for the Class of '60 notes: 'Tom Cover holds a joint appointment as Associate Professor in the departments of Electrical Engineering and Statistics at Stanford University. He is doing research on the meaning of life and is operating under the assumption that the evolution of the Universe is the output of a Turing machine with Universe-valued finite alphabet. The problem is to infer the algorithm generating the real world.' " Now, those of you who have escaped exposure to "Computer Science" may wonder about that, but I wouldn't be surprised if there were several Turing mechanics wandering around Technology Square who not only believe it, but are trying like hell to publish first—and at least one of them will argue that the alphabet is transfinite.

Then there's the front page of *The Observer* ("The Student Newspaper of Case Western Reserve University") which appeared in an Alumni Fund pledge envelope of the type that has lines on the back for writing things to be sent to your class secretary (and which presumably at one time also had something for the Alumni Fund in it), which I found particularly interesting because it contained news of a fellow Course XXI sufferer, **Sam Gorovitz**. Sam has been appointed Dean of Adelbert College—which I take to be a part of Case Western Reserve, a la Oxbridges' organizations. The article goes on to point out that he was offered the position last spring, but declined it in order to head a Commission on Education at Mather and Adelbert Colleges, the report of which he felt should be completed before he accepted the Deanship. From other sources, I've heard that Sam (Dr. Gorovitz, Associate Professor of Philosophy, actually) is also "into" philosophy of science, and the article points out several other activities, such as coaching the university's G.E. College Bowl team; so I feel that he's more than upholding the honor of the old Course. Which makes me feel a little better about being a grad school dropout myself (besides, computers are much easier to program than freshman composition students).

More notes from the backs of envelopes: "Hurrah! **Bob [Gottlieb]** just finished all his course work for his Ph.D. in aerospace engineering at the University of Texas. His orals and writtens are in a few weeks and then it's thesis time. His wife, Marilyn, divides her time between doctoral work in art history and taking care of three children—Sami (4) and twins (18 mos.) Amy and David."

**Bruce Silberg** has enrolled in the M.I.T. summer course in Programming Linguistics. . . . **Bruce Johnson** is now a vice president of the First National Bank in Colorado Springs. . . . **Bruce Layton** received an M.S. from Purdue in industrial engineering this January, and is now Operations Research Staff Officer to the Director of Plans and Programs at the Air Force Institute of Technology.

And to give equal time to classmates not named Bruce, **Barton Krawetz** writes that he was "promoted to Maj. USAF, Sept. '68; promoted to Father, January '70; girl, Adrienne Lynn" and has been assigned to the Lawrence Radiation Lab where he is engaged in laser research and enrolled in a Ph.D. program in physics at the University of California. . . . Finally, just to prove that somebody in this paragraph has a first name that doesn't begin with "B", there's a slip of green paper titled "M.I.T. ALUMNI—NOTICE OF COMPANY CHANGE" which tells us that **Lee Alter** has started his own company—the Lee Alter Co., White Plains, N.Y. Unfortunately, the form doesn't have a place for what kind of company it is, so I don't know for what needs to tell you to look him up.

One classmate who has started a business I do know about is **Norm Goldman** (whose best man I was, and whose wife is an excellent cook who contributes a great deal toward keeping old non-cooking, bachelor Uncle Mike alive). Norm's company, which is in Boston, is called Compunetics, and as the name implies is a consulting firm in computery and managementry sorts of things.

Two letters to wind up with: the du Pont Public Relations people tell us that **Robert Barnes** "recently transferred to the du Pont Company's Plastics Department's Research and Development Division at the Experimental Station near Wilmington, Del., from the Plastics Department's Market and Staff Studies Section in Wilmington. A research physicist, Dr. Barnes is investigating pulsed nuclear magnetic resonance for the study of molecular resonance in polymers. He joined du Pont in 1967." . . . And from **Burton Plaser**, the news that he recently received the Fairchild Semiconductor Corp.'s annual Salesman-of-the-Year award, part of which consists of a donation to the charity of his choice from the Sherman Fairchild Foundation. The donation was a tidy \$250 for the Alumni Fund, and I daresay that both Fairchild and Burt (who's a regional manager for them, by the way) merit thanks. . . . On that happy note, I think I'll call it a payoff and slip back into literary retirement, secure in the knowledge that next time these notes will again be splendidly filled by Linda, to whom you should write a lot or she'll have to fill in with more of my maudering. —**Linda G. Sorague**, Secretary, 10 Acorn St., Cambridge, Mass. 02139

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**Glenn Wickelgren** is a systems programmer on the PDP 15 computer. . . . **Eric Lange** was appointed executive engineer-vehicle design for Ford Motor Co. of Australia, Ltd. . . . During the past year **Richard N. Sutton** has been assigned with the 101st Airborne Division as a medical company commander in Vietnam and is now on the Mekong Delta as a general surgeon. When he returns to the U.S., he will continue residency training

at the University of Missouri School of Medicine. . . . **Richard Holland** was coauthor of an article in the February, 1970, *I.E.E.E.*, titled, "Electro-optic Effects in Ferroelectric Ceramics." He began collaborating on this article while with the Sandia Laboratory, Albuquerque, New Mexico (1964-1969). He has now transferred to Jet Propulsion Laboratory, Pasadena, Calif. . . . **Romulo H. Gonzalez-Zubieta**, **Juan Maryssael** and his wife, **Cristina**, and **Marco A. Murray Lasso** and his wife, **Nancy**, attended the 1970 M.I.T. Mexico City Club Fiesta.

**Jeff Steinfeld** sent a copy of the *Senate Congressional Record* from last December, which referred to a petition filed by our **John F. Banzhaf** and his group, Action on Smoking and Health (ASH), requesting the Department of Transportation to insist on airlines designating separate smoking and non-smoking sections. You will recall that John was instrumental in obtaining the FCC decision requiring anti-smoking messages on television.

Professor **Charles Myers**, of M.I.T., has written a section of a new book, *Training Managers: The International Guide*, published by Harper Row. . . . **T. P. Labuza** wrote an article, "Oxidation at Intermediate Moisture Levels," in the February, 1970, *Journal of the American Oil Chemist's Society*.

**Richard S. Shirley**, formerly with NASA, is now at Electronics Associates, Inc., in Palo Alto, Calif. . . . **T. J. Lageman** is now working in the food industry as manager of engineering and technical services for Olson Bros. Liquid Egg Division in Los Angeles. . . . **David H. R. Vilkomerson** is on a postdoctorate fellowship at the Hebrew University of Jerusalem, working on ultrasonic holography for medical diagnosis. . . . **Scott Danielson** is a Senior Designer at the San Francisco International Airport. He received his architectural license from the State of California and has designed a residence in Los Altos Hills. . . . **Tom Morgenstern** received a D.M.D. from the University of Pennsylvania School of Dental Medicine in 1966, served in the Army Dental Corps from 1966 through 1968; then did graduate training in orthodontics at Columbia University and is now in orthodontic practice in Hightstown, N.J. His wife **Judith** and he have a boy, **Charles**, age one year.

**Edward M. Schneider** received an M.B.A. at the University of Buffalo in June, 1969, and is with Goodyear in Akron, Ohio, as a market research administrator. . . . Named to Associate Professor at M.I.T. effective July 1, 1970, were **Thomas J. Greytak**, **John B. Heywood**, **Theodore P. Labuza**, **Donald E. Nelsen**, **Steven A. Orszag**, **Jeff Steinfeld** and **Carl Wunsch**—quite a crop. . . . Have a good summer.—**Gerald L. Katell**, Secretary, 13751 S.E. 20th St., Bellevue, Wash. 98005

## 63

There are many who have complaints

with the priorities, the amounts made available, and other aspects of the U.S. Government Budget. At last we of the Class of '63 may have an outlet for our feelings. **Dale Meyer** writes: "... I came to Washington in 1967 to work at AID, went to work at the Bureau of the Budget in 1968 as a management analyst, and am now staff assistant to the Director of the Bureau of the Budget for the review of the 1971 Budget." Dale was in Europe for a month and has taken up skiing. The latter will be quite a surprise to those who witnessed Dale's complete ecstasy on first viewing snow in back of Baker House in the fall of 1959. In case you don't recall, Dale grew up in Florida.

**Mark Hoffberg** reports that he has been a member of the faculty in the Department of Physics and Astronomy at Vassar College. Most of the bachelor members of the Class would probably be happy to swap their jobs for this one.

There is now one less bachelor. **Bob Johnson** writes that he attended **Steve Kaufman's** wedding to Sharon Malin of Cleveland. **Bob Freidenberg** was also there. Bob reports that he has joined Donaldson, Lufkin, and Jeannette, after two and one-half years at Kidder, is at Peabody, both in Manhattan. His main interest is in the computer and electronics industry.

**Joel Schindall** received his Ph.D. from M.I.T. in 1967 and reports that he is married to the former Amy Laden after a transcontinental romance. Joel is living near San Francisco and working at Watkins-Johnson. He is also lecturing at Stanford University.

#### Doctors-Actuaries-Physiologists

**Marshall Flam** is completing second year medical residency at the University of Colorado, and will be a Fellow in hematology at the University of Utah in Salt Lake City. He has an 18-month-old daughter Carley Suzanne. ... **John Flaherty** received his M.D. from Duke University in June of 1967 and is an intern in medicine at the Johns Hopkins Hospital. He is on active duty in the U.S. Public Health Service. He has two sons John, 5, and Mark, 1. ... **Ted Cohn** will receive a Ph.D. in bioengineering and then become an Acting Assistant Professor of Physiological Optics at Berkeley. He extends a greeting of ... Peace! ... to all. ... **Stephen Spock** writes: "I've left the field of metallurgy and am now employed by Aetna Life & Casualty in Hartford as an actuarial student."

**David Juncker** sent this interesting note: "Coming down the home stretch on Ph.D. in physiology and finding myself more and more involved with community problems—namely getting the Northern States Power to safely engineer their atomic reactors and pressuring slum landlords—a long battle!"

#### Births

**Mike Chessman** is living in Lexington, Mass., from where he and Mary report

the birth their first child Rachel. ...

**Larry Beckreck** and Julia have a second son, Joshua. They are living in Cambridge where Larry is with Applied Geodata Systems which he helped to found. ... **Herbert Doepken** and his wife Betsy became the parents of a boy named Jim. ... **Bob Kane** reports a second boy.

#### Politics and Government

**Frank Verlot** is active in Republican politics and has been elected Vice Chairman of the Santa Clara County Republican Central Committee. He is, when not campaigning, in program management for UTC's 120-inch diameter Titan III solid rocket booster. ... **John Harman** writes: "After two years in Venezuela with the Ford Foundation, I returned to the Washington area to work first at RMC and presently for the Department of Transportation." He is in the office of the Assistant Secretary for Transportation Policy where he is involved in the analysis of new programs going before Congress. John reports that government is much more exciting than he had imagined that it could be.

#### Academia

**Hugh Thompson** is Associate Professor of Chemistry at Rutgers in Newark. ... **Elliott Bird** has completed all course work toward his doctorate at Adelphi University and is working on his thesis in the field of category theory as applied to topology. He also teaches at C.W. Post College in Brookville, L.I. ... **Donald Day** is teaching physics at Montgomery College in Rockville, Md. ... **Steven Rudnick** is now Assistant Professor of Continuing Education at Northeastern University. ... **William Pokross** writes: "In the fall I became an instructor in economics at the University of Illinois at Chicago Circle. I am teaching a course in urban economics. We are hoping to develop the urban field into one of our strongest offerings." ... **Bob Mason** reports: that he spent three years with Sandia Laboratories, Livermore, California and then returned to academic life at Georgia Tech where he is working on a doctorate in industrial and systems engineering. He writes: "Since leaving M.I.T., I also acquired a wife and two boys (ages 8 and 9)—a giant step, but a pleasant one from bachelorhood."

#### In and out of Service

**Barry Roberts** is in the Coast Guard and his new duty station is Chief, Naval Engineering Branch 17th Coast Guard District. ... **Arnold Chalfant** writes: "I am 28, newly married, freed from active duty with the air force and hold my first full-time civilian job. My wife is a tall, winsome lass, the former Susan Allain from Connecticut, with a masters in art history."

#### And Finally

**Jerry Glaser** has left M.I.T. for Bell Labs where he will be working in the Millimeter Wave Technology Group, Whippany. ... **Richard Hervey** and his wife have a new child Paul Benjamin. He heads engineering at Winters Foundry and

Machine Co., Inc., a division of the Whittaker Corp. ... **Tony Geisler** and his wife Dee are living in St. Louis where he is a product manager in the food department of the Mallinckrodt chemical works. ... **Frederick Cunningham** is now registered as a professional engineer in the state of Connecticut. In his spare time he has learned to fly and is a licensed private pilot. ... **Steve Swerling** is head of engineering at CIDCO, Inc., in Somerville, Mass. ... **David Ritter** is in the computing department at Humble Oil and Refining in Baton Rouge doing process control work. He has one boy, Jeffrey, age one. — **Martin Schrage**, Secretary, 305 Massachusetts Ave., Arlington, Mass. 02174

## 64

The Class Hero of the month is **Mike Stulbarg**, who writes that he is interning in medicine in San Diego after receiving his M.D. last year. His wife Barby and son Andrew are enjoying the California weather, although Mike notes that he finds the year-round gardening chores a new experience. ... We need more Class Heroes, since this issue completely exhausts my supply of news. I therefore implore each of you to write your class secretary (that's me) in order to spread the highly irrelevant but quite interesting news concerning the Class of '64.

**Tom Baker** is a circuit designer for Hewlett-Packard near Loveland, Colo. He has a one-year-old son and a second child who just recently arrived. ... **Mark Barron** has written a technical report concerning various aspects of field effect transistors that was advertised in a March bulletin from the U.S. Department of Commerce. ... **James Bauman** was a naval officer through May of this year, and is now taking courses in naval construction at M.I.T. He has two children, a private pilot's license, and enjoys skiing both on land and water. ... This May, **Gerald Burnett** received his Ph.D. in electrical engineering from Princeton.

**Dennis Deegan** is working on his Ph.D. at Ohio State in the Department of Metallurgical Engineering after three years of research for U.S. Steel in Pittsburgh. Coincidentally, he is at Ohio State on a U.S. Steel Industrial Fellowship.

**Ronald Frashure** has been named a Baker Scholar for his second year at Harvard Business School. This honor is bestowed on the top 5 per cent of the second-year students at the School.

**David Guttman's** comments concerning the relationship between M.I.T. and its special laboratories were reported in the March issue of the *I.E.E.E. Student Journal*. ... **George Harlem** has been promoted to a senior engineer at Infoton, Inc., a Burlington, Mass. firm working in the computer field. He formerly was associated with Itek Corp. ... **John Ludutsky** has been promoted to manager of a division of Industrial Nucleonics



Corp. in Columbus, Ohio. He will coordinate all home office support activities in rubber and plastics as well as provide major planning assistance. . . .

**Robert Sanders** has joined Infoton, Inc. as a project engineer after leaving the Applied Research Lab at Sylvania.

**Riley Sinder** writes as follows: "Surfing down across the face of a live wall of water; the crashing behind thunder avalanche. Cascading fury spray embellishment on an apocalypse Richter 9.9. Stuck my head in and heard eternity." The meaning of the foregoing is left to our own interpretation (Riley failed to supply a crib sheet!) . . . **Richard Stimets** is working for G.E. in Cleveland in the field of luminescence after receiving his Ph.D. from M.I.T. last June. He also sings with the Cleveland Orchestra Chorus. . . . **Jerome Weiner** is self employed in Ft. Worth. He and his wife Sylvia are spending most of this summer traveling in the Orient. . . . I hope you are all having a fine summer. Let me hear from you.—**Ron Gilman**, Secretary, 5209 Peg Lane Memphis, Tenn. 38117

## 65

**Peter Heinemann** and his wife just returned from a four-month trip around the world. Peter finished his master's work at Stanford and is now working at M.I.T.'s Instrumentation Labs. . . . **Steve Ivester** is back at Polaroid after completing a three-year tour of duty as an officer in the U.S. Coast Guard where he served as an instructor at the Coast Guard Academy.

**Dick Ayers** is now the plant manager of the Bates File Manufacturing Co. near New Britain, Conn. . . . **Ralph Cicerone** will complete his Ph.D. work this June and will begin research work at the University of Michigan. . . . **Robert Moore** is on leave from Foxboro Company and is working on his Ph.D. at M.I.T.

**Jim Pearson** finished his Ph.D. in metallurgy at Tech last June and is now in the research department of the International Nickel Company's laboratory near Suffern, N.Y. . . . **Mark Stein** is completing his internship and will begin a four-year radiology residency at U.C.L.A. . . .

**Dave Carrier** is on the lunar soil analyzing team at Houston's Manned Spacecraft Center. . . . **Leonard Zacks** is working at RAND after completing his Ph.D. in operations research at M.I.T. Len's wife, the former Miss Francine Austin, has been on the picket lines with the rest of the Los Angeles teachers. . . . **Peter Addis** has joined Computer, Inc., and is developing programs for graphic display terminals.

**Stephen Schutz** received his Ph.D. in physics from Princeton. . . . **Jeff Karas** was named Man of the Year by the Temple Betham Men's Club of Los Angeles. . . . **Andy Heymann** is in the second year of G.E.'s manufacturing management program in Louisville, Ky. . . . **Henry Hsiao** co-authored an article on infrared and microwave communication by moths

which appeared in the March issue of *Spectrum*. . . . **Renato Barrera** was among the attendees at the recent Mexico City Alumni Club Fiesta. . . . **Cash Peacock** has finished his army tour of duty and is now working at the Millipore Corp. in Bedford, Mass. . . . **Chuck Seniawski** has been promoted to Captain in the Air Force and is currently involved in developing simulation exercises to test the performance of the various SAC missile crews. . . . **Bill Schreiber** and two other M.I.T. professors have developed an optical character recognition system designed for newspapers and printing applications. . . . **Lewis Green** is now working for the Pratt and Whitney Aircraft Division of United Aircraft Co.

**Walter Miller** will graduate from Duke University's School of Medicine in June and will begin a pediatric internship at the Massachusetts General Hospital. Walt has published a number of papers on molecular biological research. . . . **Marshall Slemrod** will be a postdoctoral fellow at the Institute of Mathematics, Hebrew University in Jerusalem this coming school year. . . . **Alan Bloom** is working for LOCUS, Love of Children's Universal Spirit, an Ottawa, Canada organization which designs and builds creative training centers. . . . **Bob Silverstein**, wife Ellen and son, Seth Michael, will be moving from Redondo Beach, Calif., to Washington, D.C., where Bob will be doing project management work in T.R.W.'s strategic software systems division. . . . **Henry Fitzhugh** is now a senior research fellow for the British government and is working on the Hovercraft Project. Henry received his Ph.D. in aerodynamics from London University in 1968 and was working for McDonnell-Douglas in St. Louis.

The **Bill Roeselers** announced the birth of a baby boy, Corydon Cain, last February. . . . **Gary Rose** is currently Pan American's resident engineer at Boeing. He and his wife, the former Miss Sandra Hansen of New Bedford, Mass., are the very proud parents of an energetic daughter, Kirstin Lee.—**Jim Wolf**, Secretary, Brigham Rd., Gates Mills, Ohio 44040

## 66

These words are the final ones to be written from the City of Spire, Oxford. My thesis has been handed in, and after a little holiday on the Continent we head out to Fort Collins, Colo., to make our new home. We are sad to leave this beautiful city, but one must eventually push on.

Pushing our way into the mailbag reveals a number of brief items. **Ed Fiala** has left Bolt, Beranek & Newman to join Berkeley Computer Corp. situated you-know-where. . . . **Dave Liroff** is now at the University of Ohio in Athens (Greece?). . . . **Steve Teicher** reports the birth of Jennifer Dawn on 7 April, which makes two now. . . . **John Dawson** plans an August wedding with Cheryl Klitzke '67. . . . **Rudi Dierstein** has been con-

firmed as the Head of the Computing Center of Deutsche Forschungs und Versuchsanstalt für Luft- und Raumfahrt (or DFVLR for short) in Oberpfaffenhofen, Germany. . . . **Bill Del Hagen** received his M.S. in aerospace engineering from the University of Southern California in March, 1969, and now works in Los Angeles. . . . **Marc Fogel** Course XVII, wrote *Determination of Statistical Clumps* for the National Science Foundation.

Quite a few people are on the home stretch in the race for their doctorates. **Uday Sukhatme** is working for his Sc.D. in physics at M.I.T. which he hopes to complete in June, 1971. (The degree, not M.I.T.!) . . . **Marv Sirbu** is also at the Institute and plans his Ph.D. in electrical engineering by summer, 1971. He continues as a member of the M.I.T. Commission on Education. . . . **Jerry McDonald** is at the University of Illinois studying organic chemistry. We belatedly report his marriage in June, 1967, to Susan Clark of Dennis, Mass. . . . **Ken Ault** received his M.D. from Harvard Med last month (June) and has begun an internship in internal medicine at Peter Bent Brigham Hospital in Boston.

**Richard Williams** continues in his medical studies at the University of California at San Francisco. Last summer he began a research project on marijuana, alcohol, and LSD. He reports that, physiologically, marijuana causes an increase in pulse rate, red eyes, but no pupil dilations. Psychologically, it is similar to alcohol at low doses, but more like LSD at high doses. He says that there is an enormous variation in confiscated marijuana.

**Dave Wilcox** received his Ph.D. in aeronautics from Caltech in March and then joined the Technical Staff of TRW Systems in Redondo Beach, Calif. "The paychecks are pretty welcome, especially with two children." . . . **Paul Aita** has completed his first year of doctoral studies at Brandeis University. On 2 January 1970, he was ordained to the Christian ministry, and he and his wife both work with the youth at the Leominster, Mass., First Baptist and United Methodist Churches. . . . **Joe Blew** returned from Vietnam as a First Lieutenant in the Army Engineers in August, 1969. He now works for Harry Weese & Associates, an architectural firm designing the new rapid transit system for Washington, D.C.

**Ken Browning**, Class Agent, is still working at M.I.T. as Assistant Director of Housing and Dining Service. He and Jane had their first daughter, Jennifer Lynne, on 28 March 1970, which keeps them busy. . . . **Bob Akeson** received his M.A. in June, 1969, and now teaches biology and earth science at Boston Latin School and biology at Emmanuel College. He and Carolyn expect their first child in September. . . . One final note is that when you write me, please do not use abbreviations. Although they may be second nature to you, they are not to me and cause considerable trouble in decipherment. Indeed, some never get deciphered. Cheers!—**Terry J.**



## 67

**Jeff Schoenwald** sends some news about himself and a few classmates: "As for me, I am finishing my third year at the University of Pennsylvania. I have my master's and have passed my candidacy exams in physics. As part of my education and thesis work I will spend the summer at IBM's Watson Labs to learn the techniques of ultrasonic surface wave excitations, an obscure area of physics that is beginning to absorb the interest of some physicists. I have picked up on three sports in the last six months: skiing, tennis, and horseback. Next in line: sky diving."

**Bob Rosenberger** is engaged, to whom I cannot recall, but she is from Cincinnati, where he slaves for Procter & Gamble. Word is that **Paul Goldstein** is also engaged. He's a third year med student at Washington University. . . . **Bob Schwartz** is plugging away at grad school in math at Penn. Marriage has made him "pretty imposing around the waistline."

Sharon Howarth has informed me that **Henry Howarth** became the father of twin girls, Sharlene Ayn and Sheila Lyn, October 4, 1969. They are their first. Last year Hank worked full-time at Avco-Lycoming in Stratford, Conn., and at the same time studied part-time at N.Y.U. (if you call taking five courses part-time). He received his MSEE in June of 1969. Since December he has been working for the Jet Propulsion Lab in Pasadena, Calif. He and his family live in Glendora, and they love every minute of it.—**Jim Swanson**, 1816 First Avenue North, Grand Forks, N. Dak. 58201

## 68

Would you believe that we graduated two whole years ago! This column completes two years that we've written for the *Review*. We hope you've noticed that we have not missed a month yet, and we hope it stays that way. So have a nice summer and send us a note in the fall about what you did.

Only one June bride to report: **David Caplan** married Debbie Etsten on June 5, 1970 in the M.I.T. Chapel. Dave is working on a Ph.D. in linguistics at the 'tute. Debbie, an Ohio State '69 grad, has done a great job this year working as the Graduate Student Council's secretary and we all hope she stays on.

Lieutenant **Art Cole** has graduated with honors from a training course for transportation officers at Sheppard AFB, Texas and is stationed at McGuire AFB, N.J., with the Military Airlift Command. . . .

**Bob Roach** graduated from the Navy OCS in June. He hopes to be assigned to the Bureau of Naval Personnel in Washington as an operations analyst

concerned with a computer simulation model of officers available matched with billet needs and medium range projections of them. Bob expects to get no farther to sea than in a sailboat.

**Charlie Thomas** is completing work on a master's thesis in community planning at U.R.I. He began working in Wellesley for the Planning Board on March 23. Charlie reports that he is trying to adjust to being his own boss and is developing a planning program for the next few years. . . . **Sherman Hanna** is working as a systems analyst at Cornell and plans to start an MBA program there in the fall. . . . **John Wyatt, Jr.** received a master's degree in electrical engineering from Princeton in May 1970.

Many people have asked me about my role in the Special Labs Committee this last year in light of the divestment of the D Lab. Earlier in the year I said that I would refrain from commenting because of the time delays involved. However, I think it is appropriate now to say a few words. I made a brief statement at the May 20 faculty meeting where the decision was announced. The following is the beginning of that statement and summarizes my feelings: "When I volunteered for the Special Labs Committee last fall, I did not volunteer to help cleave off part of the M.I.T. community. It was and will continue to be my firm desire to improve educational programs at the Institute consistent with the policy statements of the Pounds Panel and the Executive Committee. I am saddened by our new course, but I must emphasize that I agree with the President that the Institute has no other choice under the circumstances; for the type of projects which we can all endorse, currently have low national priority. I only hope that we can learn something from these events." . . . See you in the Fall.—**Gail and Mike Marcus**, Eastgate Apt. 16A, 60 Wadsworth St., Cambridge, Mass. 02142

## 69

As my "regular" readers have probably noticed by now, I haven't had a class column in every issue. Most of this is due to my own fault. I forget, postpone, or miss deadlines. But another problem is that I sometimes don't have any news to report. So why don't you write me and let me know what you're doing. And don't worry if you don't know me personally. Just consider your letter to me as a means of communicating with your classmates while introducing yourself to me.

**Mark Lively** reports that he was married June 6, 1970, to the former Miss Vicki Beavers of Tayewell, Va., a graduate of Radford College. Mark is presently enrolled in the Sloan School's masters program. His best man, **Russell Bjork**, had just completed his own wedding vows a week earlier on May 30. Russ's wife is the former Miss Janet Montgomery of Stamford, Conn. Russ is cur-

rently with the staff of Campus Church for Christ in Amherst, Mass. . . . Another wedding took place on June 6 involving two members of our Class. **Roy Yawn** and Barbara Padgett exchanged marital vows in Kansas City. Roy and Barb just completed their first years of medical school at Georgia and Missouri Universities, respectively. Next fall they will continue their medical studies at Missouri University.

**Ben Huie** sends word from Los Angeles that he is a graduate student in chemistry at UCLA. Having flunked his draft physical in August of 1969, his current status is 1-Y. Ben was arrested during demonstrations at UCLA on May 5 and met Charles Manson while in jail. Ben writes that he would like to hear from any M.I.T.'ers in the area. He can be reached through the Chemistry Department at UCLA. . . . **Roger J. Radley, Jr.** has been promoted to first lieutenant in the U.S. Air Force. Lt. Radley, a space vehicle engineer at Los Angeles Air Force Station in California, is assigned to the Space and Missile Systems Organization, a part of the Air Force Systems Command which manages research and development in USAF aerospace systems. He had received his commission in 1968 upon completion of Officer Training School at Lackland AFB, Texas.

**John R. Smith** is presently MTS-EE at Hughes Aircraft, Fullerton, Calif., where he is involved in design and checkout of high-speed digital radar signal processing systems. John is also working towards his master's degree in logical design/computer science at USC. John writes that he is "enjoying most the women and the weather out here in Southern California. It's a very groovy place to live—and, incidentally, the smog in Boston is *much* worse than that in Los Angeles."

**Randall J. Hekman** is married to the former Miss Marcia Ann Bealer, a graduate of Northern Illinois University. He is currently serving his military obligation by working in the office of the Special Assistant to the Secretary of the Navy in the Pentagon. Also, Randy is attending George Washington University Law School in the evening. . . . **Daniel Hoban** is now employed with U.S. Scientific Instruments in Watertown, Mass. . . . **Gary B. Carpenter** has completed his first year at Harvard Medical School.

Unfortunately, not all the news which appears in this column can be cheerful or happy. I am sorry to write that **Gregory H. Berck** passed away on April 4, 1970. He was killed in a traffic accident in New Orleans, La., while attending the University of Tulane graduate school. On behalf of our Class, I extend sincere sympathy to his family, relatives, and friends.

Have a fun summer and drop me a line when you get the chance.—**Richard J. Moen**, Secretary-Treasurer, c/o *Technology Review*, Room E19-430, Cambridge, Mass. 02139

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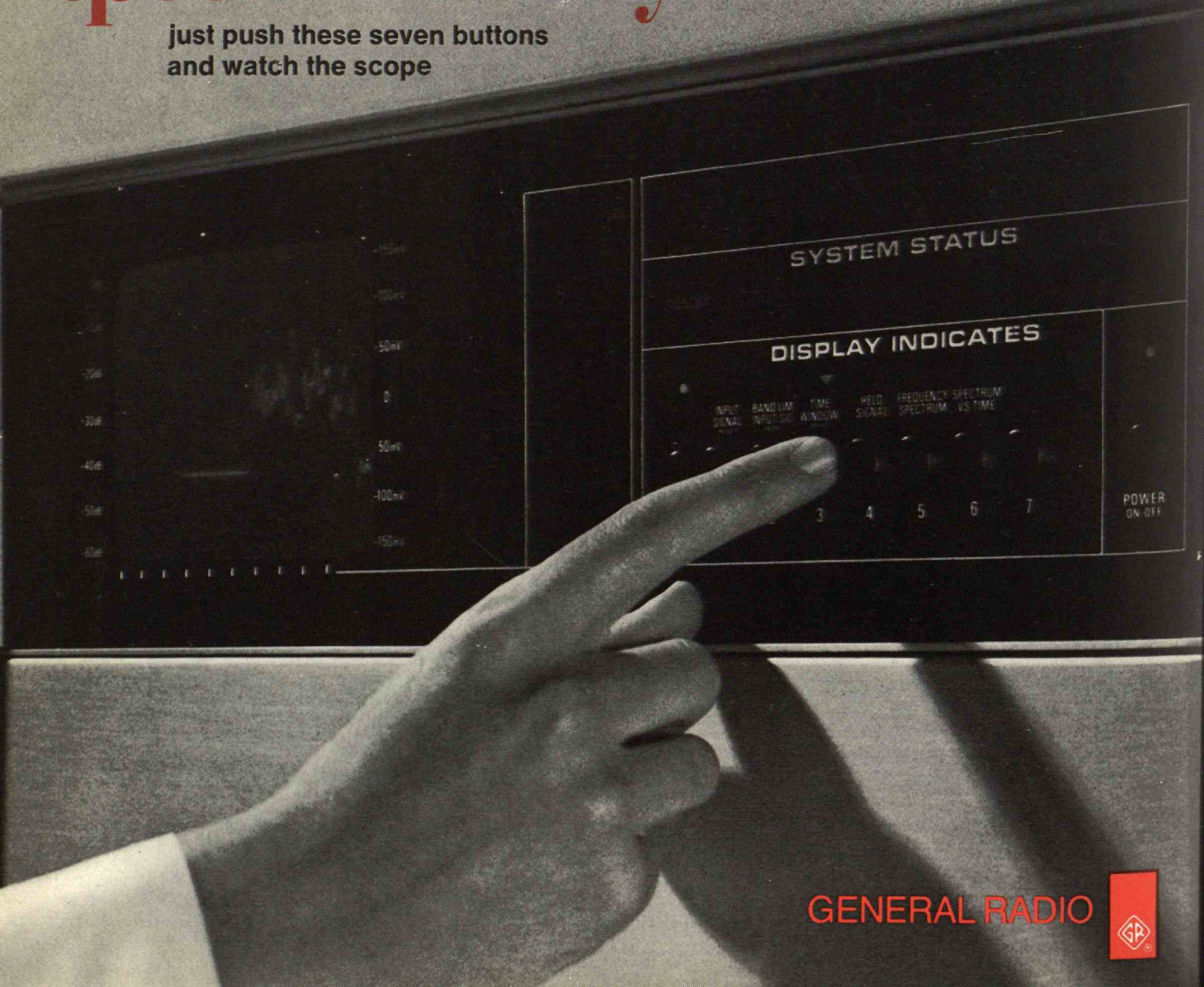
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